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Understanding decision-making in psychosis: A case series of psychological assessment and formulation of impaired treatment decision-making, and a systematic review and meta-analysis of the Attribution–Self-Representation model of persecutory delusions

Philip Murphy

Doctorate in Clinical Psychology

2017

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Overview of Thesis

This thesis follows the portfolio format and the following information provides a brief summary of the main chapters of the thesis:

Chapter 1 is a systematic review and meta-analysis of the research literature testing key predictions of the widely-studied 'paranoia as defence' model (more formally known as the 'attribution–self-representation cycle') proposed by Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001), as applied to people with psychosis with persecutory delusions. Chapter 2 presents an empirical journal article which is designed to examine the feasibility and acceptability of collaborative psychological assessment and formulation of impaired treatment decision-making capacity (TDMC) among patients with psychosis, and produce preliminary data on safety and efficacy.

Chapter 1 and Chapter 2 were written for submission to Clinical Psychology Review and Journal of Clinical Psychology & Psychotherapy, respectively.

Thesis Abstract

Purpose: A systematic review and meta-analysis was conducted to test key predictions of the widely-studied 'paranoia as defence' model (more formally known as the 'attribution–self-representation cycle') proposed by Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001), as applied to people with psychosis with persecutory delusions. A novel case series was also conducted to examine the feasibility and acceptability of collaborative psychological assessment and formulation of impaired treatment decision-making capacity (TDMC) among patients with psychosis, and produce preliminary data on safety and efficacy.

Methods: With regard to the systematic review and meta-analysis, people with psychosis with persecutory delusions were compared to healthy controls, people with depression and people with psychosis without persecutory delusions (and, if specified, grandiose delusions) on a number of outcomes: externalising attributional bias, explicit self-esteem, implicit self-esteem and discrepancy between implicit and explicit self-esteem. Correlations between paranoia severity and each of these outcomes and self-esteem instability were also examined. In regards to the case series, a formulation of impaired TDMC for 5 patient participants was developed and shared with 13 clinician participants. Acceptability, utility, working alliance and safety were assessed through pre and post self-report and interview measures.

Results: Sixty-three studies were included in the meta-analysis and systematic review, of which 33, 36, 10, 10 and 4 were used to test hypotheses on externalising attributional bias, explicit self-esteem, implicit self-esteem, implicit-explicit self-esteem discrepancy and self-esteem instability, respectively. Key model-consistent findings included the following: people with psychosis with persecutory delusions had a greater externalising attributional bias compared to all the other groups and a greater implicit-explicit self-esteem discrepancy than people with depression, and paranoia severity was positively correlated with externalising attributional bias and self-esteem instability. Key model-inconsistent findings included the following: people with psychosis with persecutory delusions had lower explicit self-esteem than healthy controls, and paranoia severity was negatively correlated with explicit self-esteem. There were also some model-inconclusive findings. Regarding the case series, 3 of the patient participants collaborated in the development of their formulation. They found the intervention safe and acceptable, following which they provided a much richer understanding of the factors that may impair their TDMC (Cohen's d = 2.16). Two patient participants only partially

adhered to the intervention protocol, but a psychological formulation was still feasible to produce and no adverse effects were reported. Clinician participants provided a much richer understanding of the factors that may impair the patient participants' TDMC (Cohen's $d = 1.36$; 95% CI = 0.63 to 2.07) after the presentation of the case formulations. Increases in knowledge, confidence and positive attitudes regarding supporting the TDMC of patients were observed. They strongly believed that the formulations cohered with their knowledge of the patient participants and were comprehensive and accurate.

Conclusions: The findings of the systematic review and meta-analysis support a 'weak' version of the paranoia as defence model, which suggests persecutory delusions are only partially effective at protecting low implicit self-esteem from reaching awareness. The findings of the case series suggest that patients with psychosis, and their clinicians, can be engaged in a collaborative psychological assessment and formulation of factors that may impair their TDMC. Initial data from the case series also suggests this process is acceptable, safe and helpful.

Chapter 1: Systematic review and meta-analysis

A systematic review and meta-analysis of the Attribution–Self-Representation model ('paranoia-as-defence') of persecutory delusions

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Abstract

Aims: To test key predictions of the widely-studied 'paranoia as defence' model (more formally known as the 'attribution–self-representation cycle') proposed by Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001), as applied to people with psychosis with persecutory delusions.

Method: We did a systematic review and meta-analysis. We compared people with psychosis with persecutory delusions to healthy controls, people with depression and people with psychosis without persecutory delusions (and, if specified, grandiose delusions) on a number of outcomes: externalising attributional bias, explicit self-esteem, implicit self-esteem and discrepancy between implicit and explicit self-esteem. We also examined the correlation between paranoia severity and these outcomes and self-esteem instability in people with psychosis.

Results: We identified 63 relevant studies, of which 33, 36, 10, 10 and 4 were used to test hypotheses on externalising attributional bias, explicit self-esteem, implicit self-esteem, implicit-explicit self-esteem discrepancy and self-esteem instability, respectively. Key model-consistent findings included the following: people with psychosis with persecutory delusions had a greater externalising attributional bias compared to all the other groups and a greater implicit-explicit self-esteem discrepancy than people with depression, and paranoia severity was positively correlated with externalising attributional bias and self-esteem instability. Key model-inconsistent findings included the following: people with psychosis with persecutory delusions had lower explicit self-esteem than healthy controls, and paranoia severity was negatively correlated with explicit self-esteem. There were also some model-inconclusive findings.

Conclusions: The findings support a 'weak' version of the paranoia as defence model, which suggests persecutory delusions are only partially effective at protecting low implicit self-esteem from reaching awareness.

1. Introduction

Persecutory (paranoid) delusions, which are characterised by unfounded beliefs that others are trying to harm the self (Freeman & Garety, 2000), are a major psychiatric problem. Indeed, they are present in over 70% of patients presenting with a first episode of psychosis (Coid et al., 2013), often result in psychiatric hospital admission (Castle, Phelan, Wessely, & Murray, 1994), and are linked to increased risk of violence (Coid et al., 2013).

In order to understand the aetiology and maintenance of persecutory delusions, different cognitive models have been put forward. One such model, which has initiated abundant research, is the attribution–self-representation cycle (ASRC) by Bentall, Corcoran, Howard, Blackwood, and Kinderman (2001), an extension of an earlier model (Bentall, Kinderman, & Kaney, 1994). This model, also referred to as the 'paranoia as defence' model, postulates that persecutory delusions reflect an attributional defence against low self-esteem reaching consciousness. In this respect, people with persecutory delusions are thought to have unconscious low self-esteem that is similar to people with depression. However, unlike people with depression, people with persecutory delusions are hypothesised to defend against low self-esteem reaching consciousness by making external-personal (other-blaming) attributions for negative events, in preference for either internal attributions or external-situational attributions. Therefore, according to the paranoia as defence model, people with persecutory delusions should have a discrepancy between implicit (unconscious) and explicit (conscious) self-esteem (with the latter being higher) as well a tendency to make external-personal attributions for negative events. Moreover, the most recent revision of the model (Bentall et al., 2001) suggests that persecutory delusions do not provide a complete defence against low self-esteem reaching consciousness and therefore self-esteem instability is expected to occur in people with persecutory delusions.

The paranoia as defence model has not been left unchallenged. Three recent systematic reviews on different domains of this model found that explicit self-esteem was largely skewed towards the negative in people with persecutory delusions (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan, Tracey, & Shannon, 2014). This discovery, it has been argued, does not fit well with a defence account, in which relative preservation of explicit self-esteem might be expected (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014). However, finding evidence of low explicit self-esteem does not preclude the 'weaker' version of the paranoia as defence model in which persecutory delusions are only partially successful

(i.e., they do not fully preserve explicit self-esteem but prevent explicit self-esteem falling as low as implicit self-esteem) (Garety & Freeman, 1999). A test of this rests on evidence of a discrepancy between implicit and explicit self-esteem in people with persecutory delusions (Garety & Freeman, 1999). Of note, the three systematic reviews found that only a minority of studies supported such a discrepancy (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014). However, two of these systematic reviews found support for an association between persecutory delusions and self-esteem instability (Kesting & Lincoln, 2013; Tiernan et al., 2014), a finding which may explain some of the hypothesised failures of the defence (Bentall et al., 2001). Moreover, one of these systematic reviews found that there was mixed evidence that people with persecutory delusions had an exaggerated externalising attributional bias for negative events (hereafter referred to, for short, as 'externalising attributional bias') (i.e., a tendency to attribute negative events to external causes) (Garety & Freeman, 2013). While this finding contrasts with that of a recent meta-analysis on domains of social cognition in schizophrenia, which indicated that there were no significant differences in externalising attributional biases among a subset of people with persecutory delusions and healthy controls (Savla et al., 2013), it was based on a much larger number of studies (37 clinical studies vs 3 clinical studies). Therefore, it has been suggested that an externalising attributional bias would plausibly be thought to occur in people with persecutory delusions but that it does not need to be tied to the further hypothesis of defending against low-esteem reaching consciousness (Garety & Freeman, 2013). This conclusion is consistent with the model by Freeman, Garety, Kuipers, Fowler, and Bebbington (2002) which incorporates the attributional bias element of the paranoia as defence model but which suggests that persecutory delusions are a direct reflection of low self-esteem and associated emotional processes of the individual and not a defence.

While the systematic reviews described above have provided an overall picture of trends in significant and non-significant findings in relation to the predictions of the paranoia as defence model, they had two notable limitations. First, they did not employ a meta-analysis. This may be problematic as many of the studies were small and therefore perhaps under-powered for detecting relationships that might have in fact existed (Maxwell, 2004). Indeed, the use of a meta-analysis can overcome the low power of small studies and therefore reconcile inconsistent and divergent findings (Berman & Parker, 2002). Second, the results of studies on discrepancies between implicit and explicit self-esteem were based on the comparison of the results between groups for each type of self-esteem separately, with just two exceptions

(Kesting, Mehl, Rief, Lindenmeyer, & Lincoln, 2011; Vazquez, Diez-Alegria, Hernandez-Lloreda, & Moreno, 2008). However, it has been argued that to adequately test the hypothesis of discrepancy, it is necessary to analyse the difference between implicit and explicit self-esteem within each group as well as differences between groups (Kesting et al., 2011; Vazquez et al., 2008). Therefore, the aim of this study was to conduct a systematic review and meta-analysis to test key predictions of the paranoia as defence model while employing a method for calculating the discrepancy between implicit and explicit self-esteem that allowed for the analysis of both within and between group differences.

Specifically, it was predicted that people with psychosis with persecutory delusions would have a greater externalising attributional bias and discrepancy between implicit and explicit self-esteem compared to healthy controls as well as people with depression and those with psychosis without persecutory delusions (and, if specified, grandiose delusions). While it was predicted that people with psychosis with persecutory delusions would have greater explicit self-esteem compared to people with depression and those with psychosis without persecutory delusions, it was predicted that they would have either similar or greater explicit self-esteem compared to healthy controls. As for implicit self-esteem, it was predicted that people with psychosis with persecutory delusions would have similar implicit self-esteem compared to people with depression but lower implicit self-esteem compared to healthy controls and people with psychosis without persecutory delusions. Moreover, it was predicted that the degree of externalising attributional bias, implicit-explicit self-esteem discrepancy, explicit self-esteem and self-esteem instability would be positively correlated with paranoia severity in people with psychosis. By contrast, a negative correlation between implicit self-esteem and paranoia severity in people with psychosis was expected. Finally, a number of pre-specified moderator analyses were explored to examine the effect of depression and study quality variables on the overall estimates of effect.

2. Methods

This study adhered to the statement of Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) (see Appendix N).

2.1. Search Strategy

The search strategy was developed in consultation with a research librarian. The reports identified in three previous systematic reviews of the relevant literature published in 2013 and 2014 (including one involving DF) (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014) were firstly collated. Electronic databases (i.e., PsycINFO, MEDLINE, EMBASE and Web of Science) were then searched by PM (in consultation with PH as well as the research librarian) from 2012 to September 2016. Search terms related to psychosis, delusions, externalising attributional bias and self-esteem were used. The reference lists of all included full-text articles were subsequently searched to identify any studies missed in the initial search. In every case where useable but unpublished data were thought to exist the relevant authors were contacted. As a final step, all corresponding authors of included studies were contacted for any further unpublished data. Further details of the search strategy are provided in Appendix C.

2.2. Study Selection

Studies were eligible for inclusion in the group comparison analyses if they measured externalising attributional bias or self-esteem (in one of the various forms) in (1) people diagnosed with a schizophrenia spectrum condition (hereafter referred to as "psychosis") of whom ≥50% had current persecutory delusions and (2) people with depression or healthy controls. Studies comparing people with psychosis with current persecutory delusions to people with psychosis without persecutory delusions were also eligible for inclusion in the group comparison analyses providing <50% of the latter group had current persecutory delusions (and, if specified, grandiose delusions). Studies without control group data were eligible for inclusion in the correlation analyses if (1) ≥50% of the sample had psychosis and (2) correlation or regression data was reported between a measure of paranoia/persecutory ideation and a measure of externalising attributional bias or self-esteem. Studies comparing people with psychosis with current persecutory delusions to people with psychosis without persecutory delusions (irrespective of the presence of grandiose delusions in the latter group) were also eligible for inclusion in the correlation analyses. Cross-sectional data (including baseline data from longitudinal studies, experimental manipulation studies and trials of interventions) were eligible for inclusion in the different analyses, with the exception of the analyses involving self-esteem instability for which only longitudinal data were eligible.

Studies were excluded where ≥50% of the persecutory delusional/psychosis sample had bipolar disorder, learning disability, a primary diagnosis of substance-induced psychosis or psychosis secondary to a general medical condition or organic pathology. Studies where samples overlapped by ≥25% were also excluded except for the study that reported on the largest number of participants. Only studies published in English were considered. Selection of studies were conducted by PM in consultation with PH against the inclusion/exclusion criteria.

2.3. Outcome Measures and Data Extraction

Different outcomes were selected corresponding to the different domains of the paranoia as defence model. The first outcome was the magnitude to which negative events were attributed to external causes, especially other people (i.e., externalising attributional bias). With regard to this, the following 'data extraction hierarchy' (which specifies what data is preferable, and what data would be used if this could not be acquired) was chosen: the external-personal attribution score for negative events (a measure of the tendency to attribute negative events to other people – rather than to oneself or situational factors) > the personalising bias score (PB) (a measure of the tendency to attribute negative events to other people rather than to situational factors) > the internality attribution score for negative events (a measure of the tendency to attribute negative events to oneself – rather than to other people or situational factors) > the externalising bias score (EB) (a measure of the tendency to attribute negative, as opposed to positive events, to external causes – either to other people or situational factors). A decision had also been made to choose the Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) (which can be used to calculate all four indices in the hierarchy above) over the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) (which can only be used to calculate the bottom two indices in the hierarchy above) if a study contained both of these measures. Moreover, participants' self-ratings (rather than independent judges' ratings) as to the extent to which their attributional statements represented an externalising/internalising attributional bias were prioritised.

The second outcome was the magnitude of explicit self-esteem, which was assessed in the first instance by the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965); if data from this scale were not available, a conceptually equivalent variant was used. A decision had also been made to prioritise negative explicit self-esteem over positive explicit self-esteem if a total explicit self-esteem score was not reported or easily calculated. The third outcome was the magnitude

of implicit self-esteem, which was derived using a measure pertaining to the following data extraction hierarchy: the Implicit Association Task (IAT; Greenwald, McGhee, & Schwartz, 1998); the Emotional Stroop Task (EST; Stroop, 1935; Williams, Matthews, & MacLeod, 1996); the Go/No-go Association Task (GNAT; Nosek & Banaji, 2001). If data from one of these measures were not available, a conceptually equivalent variant was used. The fourth outcome was the magnitude of the discrepancy between implicit and explicit self-esteem (i.e., discrepancy score). This was calculated from the choice of implicit and explicit self-esteem indices above using a method that allowed for the analysis of both within and between group differences, unless this was already reported. The fifth outcome was the magnitude of self-esteem instability, which was assessed by the Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987) or the repeated application of a self-esteem measure such as the RSES. Further details of the data extraction hierarchies/procedures and the method for calculating discrepancy scores are provided in Appendices E and F, respectively.

A spreadsheet piloted in a previous meta-analysis was used for data extraction. Data were extracted by PM who cross-checked with PH when necessary (e.g., both PM and PH independently extracted the data related to discrepancy scores following which any disagreements were adjudicated by consensus). For the analyses of group differences, means and associated standard deviations (SDs) related to the outcomes were extracted. Missing SDs were, where possible, calculated from *t* test values, *P*-values, *F*-values, standard errors (SEs) or confidence intervals (CIs) using equations specified in the Cochrane Handbook (Higgins & Green, 2011) or by Borenstein, Hedges, Higgins, and Rothstein (2009). Alternatively, missing SDs were estimated from the mean SD of the other included studies (Furukawa, Barbui, Cipriani, Brambilla, & Watanabe, 2006). Correlation coefficients and related variance parameters were extracted for the analyses of paranoia severity and the different outcomes. Missing correlation coefficients were, where possible, calculated from regression coefficients (Kelley & Maxwell, 2003; Peterson & Brown, 2005) or from group differences between people with psychosis with and without current persecutory delusions using an online effect size calculator (Wilson, 2017). In all cases of missing data, however, corresponding authors were contacted in the first instance.

2.4. Meta-Analytic Calculations

Meta-analyses were conducted using MetaXL software. For each meta-analysis of group differences, means and associated SDs were used to calculate the Hedges' g standardised mean difference (SMD) and 95% CI. When a study had two or more relevant persecutory delusional groups (or two or more relevant control groups), these were combined into one using methods described in the Cochrane Handbook (Higgins & Green, 2011).

For each meta-analysis of correlations, Pearson's correlations were converted into Fisher's Z and 95% CI. When Spearman correlations were reported, these were firstly converted into approximate Pearson's correlations (Rupinski & Dunlap, 1996). Fisher's Z estimates were then back-transformed to Pearson's correlations to allow interpretation according to Cohen's (1988) conventions.

Using Cohen's (1988) conventions for interpreting effect sizes, a Hedges' g of 0.2, 0.5, and 0.8 represent small, moderate, and large differences between groups, respectively, and a Pearson's r of 0.1, 0.3, and 0.5 represent small, moderate, and large correlations, respectively. Expanding on these conventions, a Hedges' g of 0.35 – 0.49 and a Pearson's r of 0.2 – 0.29 was considered to represent a small-moderate effect size for the purpose of this study.

Random-effects meta-analyses using the DerSimonian and Laird method (1986) were conducted for all outcomes, since these allow for true heterogeneity in effect size magnitude (due to differences in measurement, sample, etc.) (Borenstein et al., 2009). When there was less than moderate heterogeneity (i.e., I^2 <40%), a sensitivity analysis using a fixed effect analysis was carried out but this made no substantive difference to the results. Moreover, publication bias was assessed through the Doi plot and LFK index for outcomes with at least 10 studies (Higgins & Green, 2011), and, if potential publication bias was indicated (i.e., LFK index >2, which indicates major asymmetry), this was adjusted for using the 'trim and fill' method (Duval & Tweedie, 2000).

2.5. Moderator Analyses

Two prespecified moderators of effect size were examined: (1) matching of groups on demographics [age, gender, education (or IQ or a measure of intelligence if education was not reported), ethnicity]; (2) group differences in depression (operational definitions are given in Appendix G). Random effects meta-regression was used to test these moderator effects via

Comprehensive Meta-Analysis version 3 software, but not when fewer than 10 studies in a meta-analysis contained data related to the moderator of interest (Higgins & Green, 2011). Two prespecified moderator analyses were abandoned due to insufficient data, namely, the blinding of the outcome assessor and the stage of psychosis (early vs chronic).

2.6. Risk of Bias and Study Quality

In line with previous research (Larkin & Hutton, 2017), the methodological quality of all studies was assessed using an adapted version of the Agency for Healthcare Research and Quality assessment tool (AHRQ; Williams, Plassman, Burke, Holsinger, & Benjamin, 2010) (see Appendix J). This tool allows for the consistent and transparent judgement of study quality parameters such as recruitment procedures, adequate reporting, degree of participant matching and sample size.

The quality of the meta-analytical outcomes was assessed using an adapted version of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach (Guyatt et al., 2008) (see Appendix L). The overall GRADE rating (whether high, moderate, low or very low quality) incorporated considerations of the methodological quality of the studies, publication bias, inconsistency and imprecision.

The methodological quality of all studies and meta-analytical outcomes were assessed by PM and checked by PH. Both PM and PH had completed the GRADE online learning modules (2017).

2.7. Registration of Review Protocol and Subsequent Changes/Specifications

The review protocol was registered in advance with the PROSPERO International Prospective Register of Systematic Reviews (registration number: CRD42016032782) (see Appendix A). A subsequent change was the decision to compare people with psychosis with current persecutory delusions to people with psychosis without persecutory delusions (and, if specified, grandiose delusions) rather than to people with psychosis without delusions in general. Another change was the decision to restrict non-psychotic psychiatric controls to people with depression. Additional changes included using meta-regression to assess whether group differences in depression moderated the different effect sizes, rather than using a ‘data

extraction hierarchy' to prioritise the extraction of data where depression was adequately controlled, asssessing publication bias through the Doi plot and LFK index rather than using funnel plots (Barendregt & Doi, 2016), and modifying the data extraction procedures with regard to externalising attributional bias and explicit self-esteem. Two planned moderator analyses (namely, the blinding of the outcome assessor and the stage of psychosis) and an analysis of group comparisons in relation to self-esteem instability were abandoned due to insufficient data, and comparisons of group differences and correlations in implicit self-esteem were added. All of these decisions were made prior to analyses being undertaken. Further details are provided in Appendix B.

3. Results

As shown in Fig. 1 and Table 1, 63 studies were included in the analysis, of which 33, 36, 10, 10 and 4 were used to test hypotheses on externalising attributional bias, explicit self-esteem, implicit self-esteem, discrepancy between implicit and explicit self-esteem, and self-esteem instability, respectively. A list of excluded studies, with reasons for exclusion, and a detailed description of the characteristics of included studies are provided in Tables D.1 and H.1 in Appendices D and H, respectively. Of the included studies, 6 contained additional data that were not included in the original article; these data were obtained through contact with authors (Berry, Bucci, Kinderman, Emsley, & Corcoran, 2015; Fornells-Ambrojo & Garety, 2009; McKay, Langdon, & Coltheart, 2005, 2007; Mehl et al., 2014; Sundag, Lincoln, Hartmann, & Moritz, 2015). Just over half of the studies (k = 32) took place in the United Kingdom, with the remainder occurring in Germany (k = 9), United States (k = 7), Australia (k = 5), Spain (k = 4), Canada (k = 3), Netherlands (k = 2) and Norway (k = 1). Dates of publication ranged from 1991 to 2016.

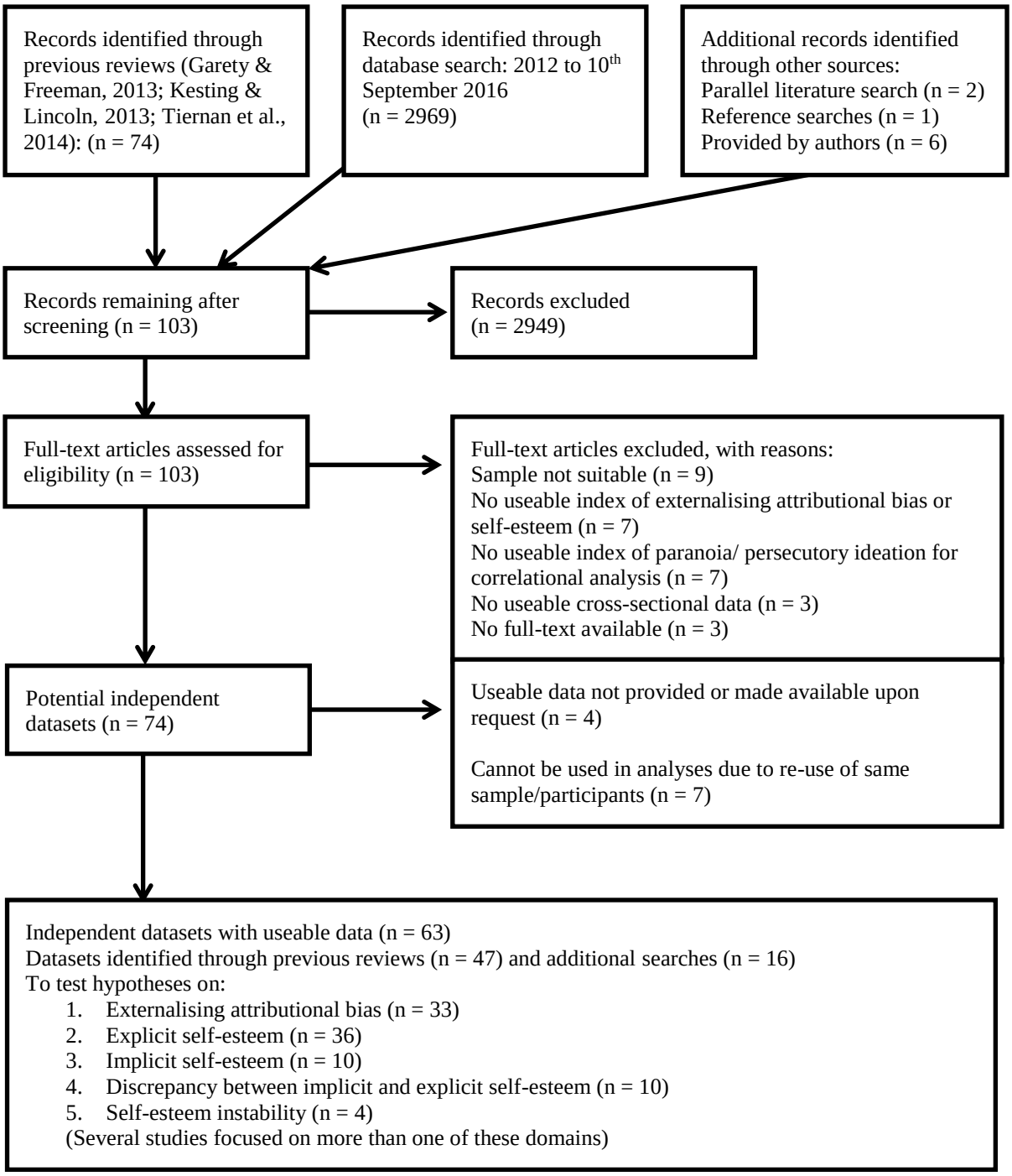


Fig. 1. PRISMA Flowchart of Study Selection

Table 1. Studies Included in the Meta-Analysis[a]

Study Ref (First Author, Year)	Participant Group/s[b] (N in Parentheses)	Relevant Domain/s
Aakre, 2009	Current PDs (18); Remitted PDs (30); Remitted non-PD delusions (17); Healthy (29)	EAB
Bentall, 1991	Current PDs (17); Depression (17); Healthy (17)	EAB
Bentall, 2005	Current PDs (16); Depression (16); Healthy (16)	EAB
Bentall, 2008	Current PDs (39); Remitted PDs (29); Depression (27); Healthy (33)	ESE
Ben-Zeev, 2009	Psychosis (194)	ESE
Berry, 2015[c]	Current PDs (25); Healthy (25)	EAB
Candido, 1990	Non-depressed PDs (15); Depressed PDs (15); Depression (15)	EAB; ESE
Carlin, 2005	Current PDs (31); Non-PD psychosis (34)	EAB
Collett, 2016	Current PDs (21); Healthy (21)	ESE
Combs, 2009	Current PDs (32); Non-PD delusions (28); Healthy (50)	EAB; ESE
Diez-Alegria, 2006	Current PDs (40); Remitted PDs (25); Depression (35); Healthy (36)	EAB
Erickson, 2012	Psychosis (57)	ESE; SEI
Espinosa, 2014	Current PDs (79); Depression (38); Healthy (52)	ESE; ISE; SED
Fear, 1996	Current PDs (20); Non-PD delusions (9); Healthy (20)	EAB
Fornells-Ambrojo, 2009[c]	Current PM PDs (20); Depression (21); Healthy (32)	EAB; ESE
Freeman, 1998	Current PDs (28); Non-PD delusions (25);	ESE
Freeman, 2012	Psychosis (130)	ESE
Garety, 2013	Current PDs (118); Current PGDs (52); Non-PGD psychosis (43)	ESE
Humphreys, 2006	Current PDs (15); Non-PD psychosis (20)	EAB; ESE
Janssen, 2006	Psychosis (23)	EAB
Jolley, 2006	Current PDs (7); Current PGDs (7); Non-PD psychosis (34)	EAB
Jones, 2010	Psychosis (87)	ESE
Kesting, 2011	Current PDs (28); Remitted PDs (31); Depression (21); Healthy (59)	ESE; ISE; SED
Kinderman, 1994	Current PDs (16); Depression (16); Healthy (16)	ESE; ISE; SED
Kinderman, 1997	Current PDs (20); Depression (20); Healthy (20)	EAB

Study Ref (First Author, Year)	Participant Group/s[b] (N in Parentheses)	Relevant Domain/s
Kinderman, 2003	Current PDs (13); Depression (11); Healthy (13)	ESE
Langdon, 2006	Current PDs (19); Non-PD psychosis (15); Healthy (21)	EAB
Langdon, 2010	Current PDs (35); Healthy (34)	EAB
Langdon, 2013	Current PDs (23); Healthy (19)	EAB
Lee, 2004	Current PDs (12); Healthy (12)	EAB
Lincoln, 2010	Current PDs (25); Remitted PDs (25); High (25) & low (25) subclinical paranoia	EAB; ESE
Lyon, 1994	Current PDs (14); Depression (14); Healthy (14)	EAB; ESE
MacKinnon, 2011	Current PDs (16); Healthy (20)	ESE; ISE; SED
Martin, 2002	Current PDs (15); Non-PD psychosis (15); Healthy (16)	EAB
McCulloch, 2006	Current PDs (13); Depression (15); Healthy (15)	ESE; ISE; SED
McKay, 2005[c]	Current PDs (13); Remitted PDs (12); Healthy (19)	EAB
McKay, 2007[c]	Current PDs (10); Remitted PDs (10); Healthy (19)	ESE; ISE; SED
Mehl, 2010	Current PDs (23); Remitted PDs (18); Healthy (22)	EAB
Mehl, 2014[c]	Psychosis (258); Healthy (51)	EAB
Melo, 2006	Current PM PDs (26); Current BM PDs (18); Healthy (21)	EAB
Melo, 2013	Current PM PDs (32); Current BM PDs (12); Healthy (25)	EAB; ESE
Menon, 2013	Current delusions of reference (18); Healthy (17)	EAB
Merrin, 2007	Current PDs (24); Depression (24); Healthy (24)	EAB
Mizrahi, 2008	Psychosis (86)	EAB
Moritz, 2006	Current PDs (13); Non-PD psychosis (10); Depression (14); Healthy (41)	ESE; ISE; SED
Moritz, 2007	Psychosis (35); Depression (18); Healthy (28)	EAB
Palmier-Claus, 2011	Psychosis (256)	SEI
Randall, 2003	Current PDs (18); Remitted PDs (14); Healthy (18)	EAB
Randjbar, 2011	Current PDs (10); Non-PD psychosis (19); Healthy (33)	ESE
Ringer, 2014	Psychosis (88)	ESE
Romm, 2011	Psychosis (113)	ESE

Study Ref (First Author, Year)	Participant Group/s[b] (N in Parentheses)	Relevant Domain/s
Sharp, 1997	Current delusions (19); Non-PGD psychosis (12); Healthy (24)	EAB
Smith, 2005	Current GDs (20); Healthy (21)	ESE; ISE; SED
Sundag, 2015[c]	Current PDs (33); Remitted PDs (10); Healthy (33)	ESE
Thewissen, 2008	Current PDs (30); Non-PD Psychosis (34); Remitted psychosis (15); High schizotypy (38); Healthy (37)	ESE; SEI
Udachina, 2012	Current PM PDs (14); Current BM PDs (15); Remitted PDs (12); Healthy (23)	ESE; SEI
Valiente, 2011	Current PDs (35); Depression (35); Healthy (44)	ESE; ISE; SED
Vass, 2015	Psychosis (80)	ESE
Vazquez, 2008	Current PDs (40); Remitted PDs (25); Depression (35); Healthy (36)	ESE; ISE; SED
Vorontsova, 2013	Non-depressed PDs (30); Depression (30); Healthy (30)	ESE
Warman, 2011	Psychosis (30)	ESE
Wickham, 2015	Psychosis (176)	ESE
Wittorf, 2012	Current PDs (20); Depression (20); Healthy (55)	EAB

Abbreviations: BM, bad me; EAB, externalising attributional bias; ESE, explicit self-esteem; GDs, grandiose delusions; ISE, implicit self-esteem; PDs, persecutory delusions; PGDs, persecutory and grandiose delusions; PM, poor me; SED, self-esteem discrepancy; SEI, self-esteem instability.

[a]A more detailed description of the characteristics of these included studies is provided in Table H.1 in Appendix H.

[b]The participants in the current and remitted delusional groups had psychosis.

[c]Additional data were provided by the authors.

3.1. Risk of Bias and Quality Ratings

The overall AHRQ ratings related to the methodological quality of the studies are presented in Table 2 (outcome-specific study quality tables are presented in Table K.1 to Table K.17 in Appendix K), and overall GRADE ratings related to the quality of each of the meta-analytical outcomes are shown in the second from right-hand column of Table 3.

Consistent methodological problems were a failure to provide prespecified power calculations and to blind researchers from group allocation. Another problem, albeit to a lesser extent, was a lack of matching groups on key demographic variables.

Most of the studies selected their participants in a relatively unbiased way (although convenience samples were widely employed), provided adequate information regarding sample characteristics, and used valid and reliable measures to establish diagnosis/absence of diagnosis and rate PD severity. Measures used to assess the outcomes were also generally reliable and valid; however, just over a third of the measures used to assess externalising attributional bias were only judged to be partially reliable and valid, primarily because they represented the bottom two indices of the data extraction hierarchy (i.e., they failed to distinguish between external-personal and external-situational attributions).

Table 2. Overview of Assessment of Study Methodological Quality

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Studies Containing Externalising Attributional Bias												
Aakre, 2009	Yes	Partial	No	Yes	Yes	Yes	Yes	—	Yes	—	Yes	Yes
Bentall, 1991	Unclear	Partial[b]	No	Yes	Yes	Yes	Partial	Yes	Unclear	—	No	Yes
Bentall, 2005	Yes	Partial[b]	No	Yes	Yes	Yes	Partial	Yes	Partial	—	No	Yes
Berry, 2015	Yes	Partial	No	Yes	Yes	Yes	Unclear	—	Yes	—	No	Yes
Candido, 1990	Yes	No	No	Partial	Partial	Yes	—	Yes	Partial	—	No	Yes
Carlin, 2005	Partial	Unclear	No	No	Partial	Partial	—	—	Partial	—	No	Yes
Combs, 2009	Partial	No	No	Yes	Yes	Yes	Partial	—	Yes	—	No	Yes
Diez-Alegria, 2006	Partial	Partial[b]	No	Partial	Partial	Yes	Yes	Partial	Yes	—	No	Yes
Fear, 1996	Unclear	Unclear	No	No	Partial	Partial	Partial	—	Yes	—	No	Yes
Fornells-Ambrojo, 2009	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Humphreys, 2006	Yes	Unclear	No	Partial	Partial	Yes	—	—	Partial	—	No	Yes
Janssen, 2006	Yes	—	No	Yes	Yes	Yes	—	—	Partial	—	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Jolley, 2006	Yes	Unclear	No	No	Yes	Yes	—	—	Partial	—	Partial[d]	Yes
Kinderman, 1997	Partial	Unclear	No	Partial	Partial	Yes	Partial	Partial	Yes	—	No	Yes
Langdon, 2006	Yes	Partial[b]	No	Partial	Yes	Yes	Yes	—	Yes	—	No[e]	Yes
Langdon, 2010	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Langdon, 2013	Yes	Partial	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Lee, 2004	Yes	Partial	No	Partial	Yes	Yes	Partial	—	Yes	—	No	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Partial	—	Yes	—	No	Yes
Lyon, 1994	Partial	Partial[b]	No	Yes	Yes	Yes	Partial	Yes	Partial	—	No	Yes
Martin, 2002	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	—	Yes	—	No[e]	Yes
McKay, 2005	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	—	No[e]	Yes
Mehl, 2010	Yes	Yes	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Unclear
Mehl, 2014	Yes	Yes	No	Yes	Yes	Yes	Yes	—	Partial	—	Partial[d]	Yes
Melo, 2006	Yes	No	No	Yes	Yes	Yes	Yes	—	Partial	—	No	Yes
Melo, 2013	Yes	Yes	No	Yes	Yes	Yes	Yes	—	Unclear	—	No	Yes
Menon, 2013	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Merrin, 2007	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	Partial	—	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Mizrahi, 2008	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Moritz, 2007	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Partial	—	No[e]	Yes
Randall, 2003	Unclear	No	No	Yes	Partial	Yes	Unclear	—	Yes	—	No[e]	Yes
Sharp, 1997	Partial	Partial[b]	No	Partial	Yes	Yes	Partial	—	Partial	—	No	Yes
Wittorf, 2012	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Partial	—	No	Yes
Studies Containing Explicit Self-Esteem												
Bentall, 2008	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Ben-Zeev, 2009	Yes	—	No	No	Partial	Yes	—	—	Yes	—	No	Yes
Candido, 1990	Yes	No	No	Partial	Partial	Yes	—	Yes	Yes	—	No	Yes
Collett, 2016	Yes	Partial	Yes	Partial	Partial	Yes	Partial	—	Yes	—	No	Yes
Combs, 2009	Partial	No	No	Yes	Yes	Yes	Partial	—	Yes	—	No	Yes
Erickson, 2012	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Espinosa, 2014	Partial	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Fornells-Ambrojo, 2009	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Freeman, 1998	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Freeman, 2012	Yes	—	No	Partial	Yes	Yes	—	—	Yes	—	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Garety, 2013	Yes	Partial	No	Partial	Yes	Yes	—	—	Yes	—	Partial[d]	Yes
Humphreys, 2006	Yes	Unclear	No	Partial	Partial	Yes	—	—	Yes	—	No	Yes
Jones, 2010	Yes	—	No[c]	Partial	Yes	Yes	—	—	Yes	—	Partial[d]	Yes
Kesting, 2011	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Partial	Yes	Unclear	—	No	Yes
Kinderman, 2003	Yes	Unclear	No	Partial	Unclear	Yes	Partial	Partial	Partial	—	No	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Partial	—	Yes	—	No	Yes
Lyon, 1994	Partial	Partial[b]	No	Yes	Yes	Yes	Partial	Yes	Yes	—	No	Yes
MacKinnon, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Melo, 2013	Yes	Yes	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Moritz, 2006	Yes	Partial[b]	No	Partial	Yes	Yes	Partial	Partial	Yes	—	No	Yes
Randjbar, 2011	Partial	Partial	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Ringer, 2014	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Romm, 2011	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Smith, 2005	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Sundag, 2015	Partial	Partial[b]	No	Yes	Yes	Yes	Yes	—	Yes	—	No	Yes
Thewissen, 2008	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Udachina, 2012	Yes	Partial	No	Yes	Partial	Yes	Partial	—	Yes	—	No	Yes
Valiente, 2011	Partial	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Vass, 2015	Yes	—	No	Yes	Yes	Yes	—	—	Yes	—	No	Yes
Vazquez, 2008	Partial	Partial[b]	No	Partial	Partial	Yes	Yes	Partial	Yes	—	No	Yes
Vorontsova, 2013	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	—	No	Yes
Warman, 2011	Yes	—	No	Partial	Yes	Yes	—	—	Yes	—	No	Yes
Wickham, 2015	Yes	—	No	Partial	Yes	Yes	—	—	Yes	—	No	Yes
Studies Containing Implicit and Explicit Self-Esteem												
Espinosa, 2014	Partial	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Partial	Yes	Unclear	Partial	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining Persecutory Delusions or Measuring Paranoia/ Persecutory Ideation?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Ascertaining Depression?	Validated Method of Measuring Externalising Attributional Bias or Explicit Self-Esteem?	Validated Method of Measuring Implicit Self-Esteem or Self-Esteem Instability	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
MacKinnon, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	—	Yes	Yes	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Partial	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	Yes	No	Yes
Moritz, 2006	Yes	Partial[b]	No	Partial	Yes	Yes	Partial	Partial	Yes	Yes	No	Yes
Smith, 2005	Yes	No	No	Yes	Yes	Yes	Yes	—	Yes	Yes	No	Yes
Valiente, 2011	Partial	Partial[b]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial[b]	No	Partial	Partial	Yes	Yes	Partial	Yes	Yes	No	Yes
Studies Containing Self-Esteem Instability												
Erickson, 2012	Yes	—	No	Yes	Yes	Yes	—	—	—	Yes	No	Yes
Palmier-Claus, 2011	Yes	—	No	Yes	Yes	Yes	—	—	—	Yes	Partial[d]	Yes
Thewissen, 2008	Yes	—	No	Yes	Yes	Yes	—	—	—	Yes	No	Yes
Udachina, 2012	Yes	Partial	No	Yes	Partial	Yes	Partial	—	—	Yes	No	Yes

[a]Group comparison studies only.
[b]An overall 'partial' rating was assigned when different group comparisons in the study received different ratings but when at least one of these group comparisons received a 'partial' or 'yes' rating (outcome-specific study quality tables are presented in Table L.1 to Table L.17 in Appendix L).
[c]Explicit self-esteem was a secondary outcome so a power calculation would not be expected.

[d]Raters were blind to treatment allocation, but not clinical status.
[e]Independent judges' ratings of the participants' responses on the attributional style measure were blind to clinical status, but these were not applicable (self-ratings were our primary outcome).

3.2. Meta-Analytic Outcomes

Table 3 provides a summary of the meta-analytic outcomes. A selection of forest plots for outcomes related to externalising attributional bias, discrepancy between implicit and explicit self-esteem, and self-esteem instability are presented in Fig.2 to Fig.4, respectively (the forest plots related to all of the outcomes are shown in Fig. M.1 to Fig. M.17 in Appendix M).

3.2.1. Externalising Attributional Bias

The analyses revealed that people with psychosis with persecutory delusions had a small-moderately greater externalising attributional bias than healthy controls (k = 27; N = 1442; g = 0.48; 95% CI = 0.23 to 0.73; I^2 = 80%; moderate quality evidence) and people with psychosis without persecutory delusions (k = 11; N = 480; g = 0.40; 95% CI = 0.12 to 0.68; I^2 = 53%; moderate quality evidence). A large difference in externalising between people with psychosis with persecutory delusions and people with depression was observed (k = 10; N = 421; g = 1.06; 95% CI = 0.48 to 1.63; I^2 = 86%; moderate quality evidence). There was also a small positive correlation between paranoia severity and externalising attributional bias in people with psychosis (k = 21; N = 1128; r = 0.18; 95% CI = 0.08 to 0.27; I^2 = 58%; moderate quality evidence). These results are all consistent with the predictions of the paranoia as defence model (see Fig. 2).

3.2.2. Explicit Self-Esteem

Consistent with the paranoia as defence model, people with psychosis with persecutory delusions had significantly greater explicit self-esteem than people with depression (k = 13; N = 647; g = 0.89; 95% CI = 0.51 to 1.28; I^2 = 80%; moderate quality evidence). However, contrary to the model, people with psychosis with persecutory delusions had significantly lower explicit self-esteem compared to healthy controls (k = 22; N = 1256; g = -0.88; 95% CI = -1.10 to -0.66; I^2 = 68%; high quality evidence) and similar explicit self-esteem to people with psychosis without persecutory delusions (k = 11; N = 644; g = -0.26; 95% CI = -0.54 to 0.02; I^2 = 58%; moderate quality evidence). Also contrary to the model, a small-moderate negative correlation between paranoia severity and explicit self-esteem in people with psychosis was observed (k = 23; N = 1866; r = -0.26; 95% CI = -0.34 to -0.17; I^2 = 74%; high quality evidence).

3.2.3. Implicit Self-Esteem

Consistent with the paranoia as defence model, people with psychosis with persecutory delusions had small-moderately lower implicit self-esteem than healthy controls (k = 10; N = 593; g = -0.42; 95% CI = -0.72 to -0.11; I^2 = 66%; low quality evidence) and similar implicit self-esteem to people with depression (k = 7; N = 398; g = -0.13; 95% CI = -0.47 to 0.21; I^2 = 60%; very low quality evidence). However, no significant difference in implicit self-esteem between people with psychosis with and without persecutory delusions was observed (k = 4; N = 167; g = -0.24; 95% CI = -0.77 to 0.30; I^2 = 61%; low quality evidence), nor was there a significant correlation between paranoia severity and implicit self-esteem in people with psychosis (k = 4; N = 167; r = -0.13; 95% CI = -0.38 to 0.15; I^2 = 62%; low quality evidence).

3.2.4. Discrepancy between Implicit and Explicit Self-Esteem

People with psychosis with persecutory delusions had a significantly greater discrepancy between their explicit and implicit self-esteem than people with depression (k = 7; N = 398; g = 0.54; 95% CI = 0.28 to 0.80; I^2 = 33%; moderate quality evidence) (see Fig. 3), which is consistent with the paranoia as defence model. However, there was no evidence that people with psychosis with persecutory delusions had a greater implicit-explicit self-esteem discrepancy than healthy individuals (k = 10; N = 592; g = -0.11; 95% CI = -0.40 to 0.18; I^2 = 63%; very low quality evidence) or people with psychosis without persecutory delusions (k = 4; N = 165; g = 0.17; 95% CI = -0.19 to 0.53; I^2 = 20%; moderate quality evidence), and no significant correlation was found between paranoia severity and discrepancy scores in people with psychosis (k = 4; N = 165; r = 0.09; 95% CI = -0.09 to 0.26; I^2 = 15%; moderate quality evidence).

3.2.5. Self-Esteem Instability

As predicted by the paranoia as defence model, there was a significant positive correlation between paranoia severity and self-esteem instability in people with psychosis ((k = 4; N = 508; r = 0.23; 95% CI = 0.11 to 0.34; I^2 = 38%; high quality evidence) (see Fig. 4). Group comparisons in self-esteem instability could not be conducted due to insufficient studies.

3.3. Moderator Analyses

The results of the moderator analyses are presented in the right-hand column of Table 3. Only one moderator was significant: differences in depression significantly influenced the effect size for explicit self-esteem (psychosis with persecutory delusions vs healthy controls) (B = -0.70; SE = 0.23; P = 0.002). When people with psychosis with persecutory delusions were more depressed, they also had lower explicit self-esteem. However, the goodness of fit test was significant (Q = 31.71; P = 0.003), which suggests that between-study differences in depression did not completely explain the between-group differences in self-esteem.

3.4. Publication Bias

The LFK indices for the assessment of publication bias for the meta-analytic outcomes are presented in the third from right-hand column of Table 3. Potential publication bias (i.e., LFK index >2) was indicated for the effect sizes related to externalising attributional bias and explicit self-esteem (psychosis with persecutory delusions vs depression), and, as such, the 'trim and fill' method (Duval & Tweedie, 2000) was applied for these two effect sizes. This method did not identify any potentially missing studies; thus, the point estimates remained the same. This could suggest that any publication bias was not likely to affect the overall magnitude of the effect sizes, although caution should be exercised in this interpretation as the 'trim and fill' method (Duval & Tweedie, 2000) is known to perform poorly in the presence of substantial between-study heterogeneity (Terrin, 2003; Peters, 2007).

Table 3. Summary of Meta-Analyses and Meta-Regression Moderator Analyses

Outcome	N Included Studies	Psychosis, N	Control, N	Hedges' g or *r* (95% CI)	Heterogeneity: I^2, Chi^2 *P*-value	Publication bias: LFK index	Quality (GRADE)	Moderator: N, *B*, SE, *P*-value
Externalising attributional bias (EAB)								
Difference in EAB: psychosis with persecutory delusions (PDs) vs healthy controls	27	732	710	g = 0.48 (0.23, 0.73)	80%, *P* < 0.001	0.99	Moderate -1 inconsistency	Matching of groups:[a] N = 16/25; *B* = 0.45; SE = 0.29; *P* = 0.113 Depression differences:[b] N = 17; *B* = 0.05; SE = 0.22; *P* = 0.833
Difference in EAB: psychosis with PDs vs depression	10	221	200	g = 1.06 (0.48, 1.63)	86%, *P* < 0.001	2.15	Moderate -1 inconsistency -1 quality (lack of matching, blinding & power calculations) +1 large effect	—
Difference in EAB: psychosis with PDs vs psychosis without PDs (and, if specified, GDs)	11	232	248	g = 0.40 (0.12, 0.68)	53%, *P* = 0.018	-0.38	Moderate -1 imprecision	—

Outcome	N Included Studies	Psychosis, N	Control, N	Hedges' g or *r* (95% CI)	Heterogeneity: I^2, Chi^2 *P*-value	Publication bias: LFK index	Quality (GRADE)	Moderator: N, *B*, SE, *P*-value
Correlation between EAB and paranoia severity in people with psychosis	21	1128	—	*r* = 0.18 (0.08, 0.27)	58%, *P* = 0.001	0.70	Moderate -1 imprecision	—
Explicit self-esteem (ESE)								
Difference in ESE: psychosis with PDs vs healthy controls	22	576	680	g = -0.88 (-1.10, -0.66)	68%, *P* < 0.001	0.18	High	Matching of groups:[a] N = 12/21; *B* = -0.03; SE = 0.24; *P* = 0.910 Depression differences:[b] N = 15; *B* = -0.70; SE = 0.23; *P* = 0.002
Difference in ESE: psychosis with PDs vs depression	13	355	292	g = 0.89 (0.51, 1.28)	80%, *P* < 0.001	2.05	Moderate -1 inconsistency -1 quality (lack of matching, blinding & power calculations) +1 large effect	Matching of groups:[a] N = 3/12; *B* = -0.49; SE = 0.50; *P* = 0.326
Difference in ESE: psychosis with PDs vs psychosis without PDs (and, if specified, GDs)	11	411	233	g = -0.26 (-0.54, 0.02)	58%, *P* = 0.01	-0.96	Moderate -1 imprecision	—

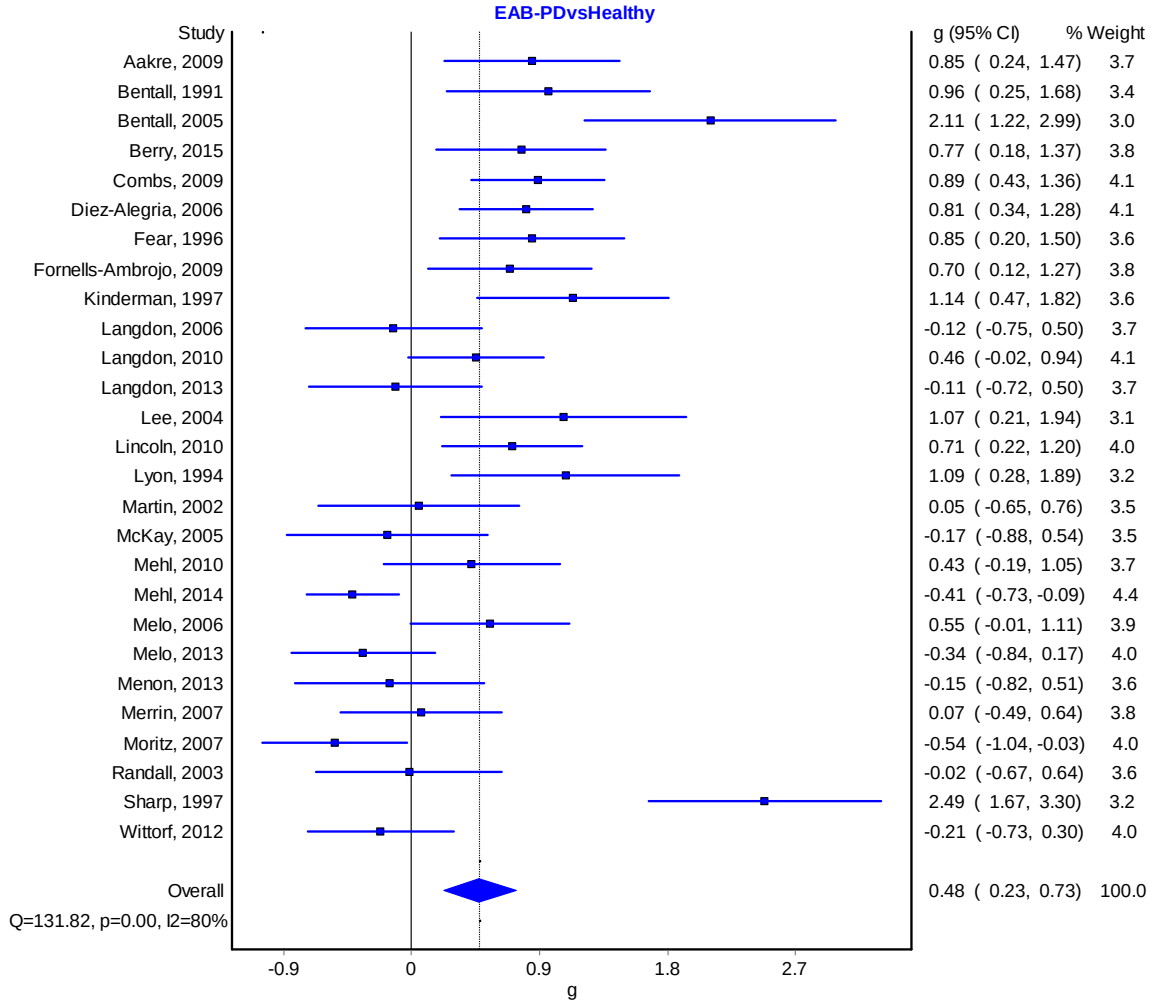
Outcome	N Included Studies	Psychosis, N	Control, N	Hedges' g or *r* (95% CI)	Heterogeneity: I^2, Chi^2 *P*-value	Publication bias: LFK index	Quality (GRADE)	Moderator: N, *B*, SE, *P*-value
Correlation between ESE and paranoia severity in people with psychosis	23	1866	—	*r* = -0.26 (-0.34, -0.17)	74%, *P* < 0.001	0.87	High	—
Implicit self-esteem (ISE)								
Difference in ISE: psychosis with PDs vs healthy controls	10	270	323	g = -0.42 (-0.72, -0.11)	66%, *P* = 0.002	-0.23	Low -1 imprecision -1 quality (lack of matching, blinding & power calculations)	Matching of groups:[a] N = 5/10; *B* = -0.30; SE = 0.32; *P* = 0.338
Difference in ISE: psychosis with PDs vs depression	7	224	174	g = -0.13 (-0.47, 0.21)	60%, *P* = 0.02	—	Very low -1 inconsistency -1 imprecision -1 quality (lack of matching, blinding & power calculations)	—
Difference in ISE: psychosis with PDs vs psychosis without PDs (and, if specified, GDs)	4	91	76	g = -0.24 (-0.77, 0.30)	61%, *P* = 0.054	—	Low -1 inconsistency -1 imprecision	—
Correlation between ISE and paranoia severity in people with psychosis	4	167	—	*r* = -0.13 (-0.38, 0.15)	62%, *P* = 0.049	—	Low -1 inconsistency -1 imprecision	—

Outcome	N Included Studies	Psychosis, N	Control, N	Hedges' g or *r* (95% CI)	Heterogeneity: I^2, Chi^2 *P*-value	Publication bias: LFK index	Quality (GRADE)	Moderator: N, *B*, SE, *P*-value
Discrepancy scores (DS)[c]								
Difference in DS: psychosis with PDs vs healthy controls	10	269	323	g = -0.11 (-0.40, 0.18)	63%, *P* = 0.004	-1.28	Very low -1 inconsistency -1 imprecision -1 quality (lack of matching, blinding & power calculations)	Matching of groups:[a] N = 5/10; *B* = 0.14; SE = 0.31; *P* = 0.663
Difference in DS: psychosis with PDs vs depression	7	224	174	g = 0.54 (0.28, 0.80)	33%, *P* = 0.176	—	Moderate -1 quality (lack of matching, blinding & power calculations)	—
Difference in DS: psychosis with PDs vs psychosis without PDs (and, if specified, GDs)	4	90	75	g = 0.17 (-0.19, 0.53)	20%, *P* = 0.287	—	Moderate -1 imprecision	—
Correlation between DS and paranoia severity in people with psychosis	4	165	—	*r* = 0.09 (-0.09, 0.26)	15%, *P* = 0.315	—	Moderate -1 imprecision	—
Self-esteem instability (SEI)								
Correlation between SEI and paranoia severity in people with psychosis	4	508	—	*r* = 0.23 (0.11, 0.34)	38%, *P* = 0.186	—	High	—

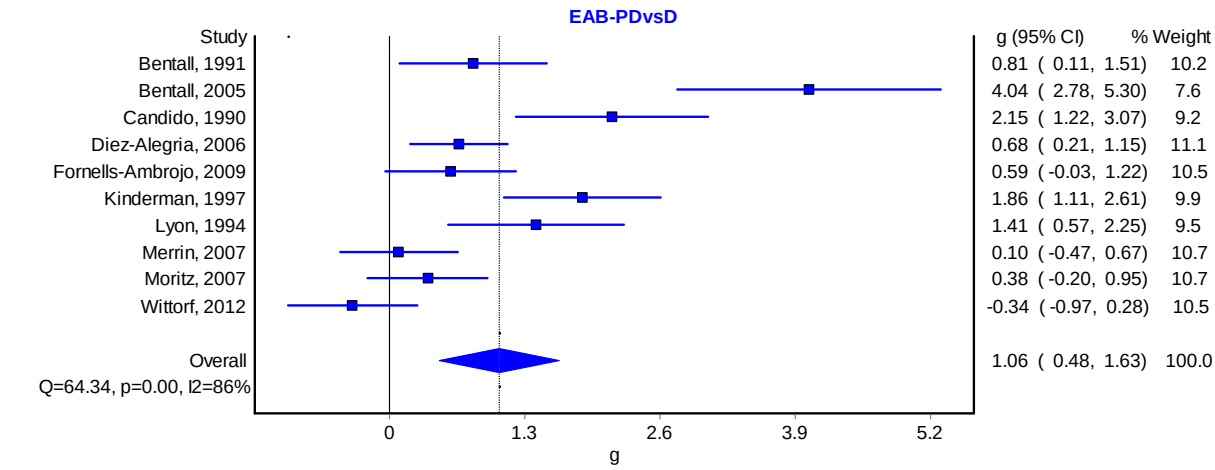
Abbreviations: GDs, grandiose delusions; PDs, persecutory delusions.
[a]'Matching of groups' was a binary moderator (0 = unmatched, 1 = matched). N represents the number of studies where the moderator =1.
[b]'Depression differences' (quantified using the SMD, d) was a continuous moderator. N represents the number of studies in the analysis.

[c]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

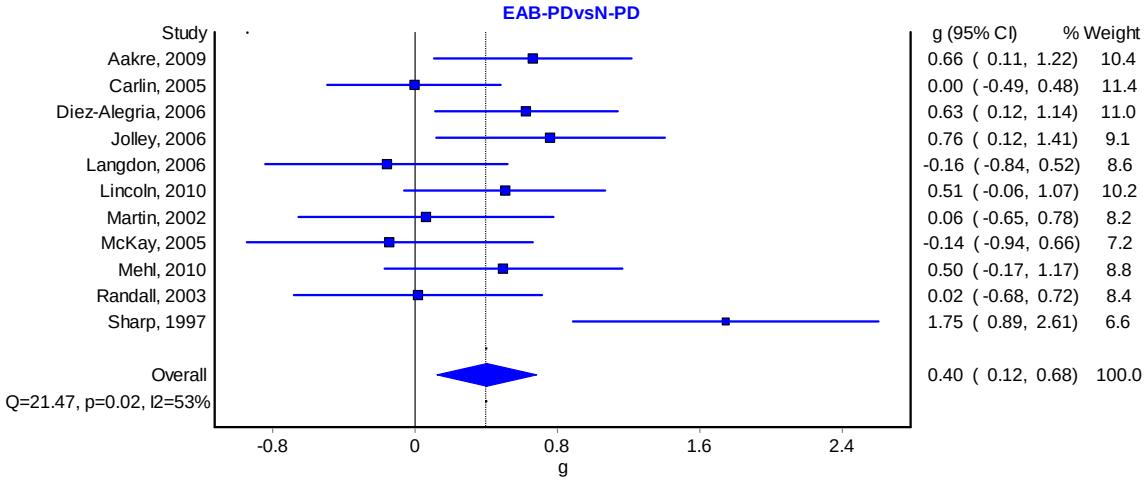
A


EAB-PDvsHealthy
Study
g (95% CI)
% Weight
Aakre, 2009 0.85 (0.24, 1.47) 3.7
Bentall, 1991 0.96 (0.25, 1.68) 3.4
Bentall, 2005 2.11 (1.22, 2.99) 3.0
Berry, 2015 0.77 (0.18, 1.37) 3.8
Combs, 2009 0.89 (0.43, 1.36) 4.1
Diez-Alegria, 2006 0.81 (0.34, 1.28) 4.1
Fear, 1996 0.85 (0.20, 1.50) 3.6
Fornells-Ambrojo, 2009 0.70 (0.12, 1.27) 3.8
Kinderman, 1997 1.14 (0.47, 1.82) 3.6
Langdon, 2006 -0.12 (-0.75, 0.50) 3.7
Langdon, 2010 0.46 (-0.02, 0.94) 4.1
Langdon, 2013 -0.11 (-0.72, 0.50) 3.7
Lee, 2004 1.07 (0.21, 1.94) 3.1
Lincoln, 2010 0.71 (0.22, 1.20) 4.0
Lyon, 1994 1.09 (0.28, 1.89) 3.2
Martin, 2002 0.05 (-0.65, 0.76) 3.5
McKay, 2005 -0.17 (-0.88, 0.54) 3.5
Mehl, 2010 0.43 (-0.19, 1.05) 3.7
Mehl, 2014 -0.41 (-0.73, -0.09) 4.4
Melo, 2006 0.55 (-0.01, 1.11) 3.9
Melo, 2013 -0.34 (-0.84, 0.17) 4.0
Menon, 2013 -0.15 (-0.82, 0.51) 3.6
Merrin, 2007 0.07 (-0.49, 0.64) 3.8
Moritz, 2007 -0.54 (-1.04, -0.03) 4.0
Randall, 2003 -0.02 (-0.67, 0.64) 3.6
Sharp, 1997 2.49 (1.67, 3.30) 3.2
Wittorf, 2012 -0.21 (-0.73, 0.30) 4.0
Overall 0.48 (0.23, 0.73) 100.0
Q=131.82, p=0.00, I2=80%
-0.9
0
0.9
1.8
2.7
g

B


EAB-PDvsD
Study
g (95% CI)
% Weight
Bentall, 1991 0.81 (0.11, 1.51) 10.2
Bentall, 2005 4.04 (2.78, 5.30) 7.6
Candido, 1990 2.15 (1.22, 3.07) 9.2
Diez-Alegria, 2006 0.68 (0.21, 1.15) 11.1
Fornells-Ambrojo, 2009 0.59 (-0.03, 1.22) 10.5
Kinderman, 1997 1.86 (1.11, 2.61) 9.9
Lyon, 1994 1.41 (0.57, 2.25) 9.5
Merrin, 2007 0.10 (-0.47, 0.67) 10.7
Moritz, 2007 0.38 (-0.20, 0.95) 10.7
Wittorf, 2012 -0.34 (-0.97, 0.28) 10.5
Overall 1.06 (0.48, 1.63) 100.0
Q=64.34, p=0.00, I2=86%
0
1.3
2.6
3.9
5.2
g

C



D

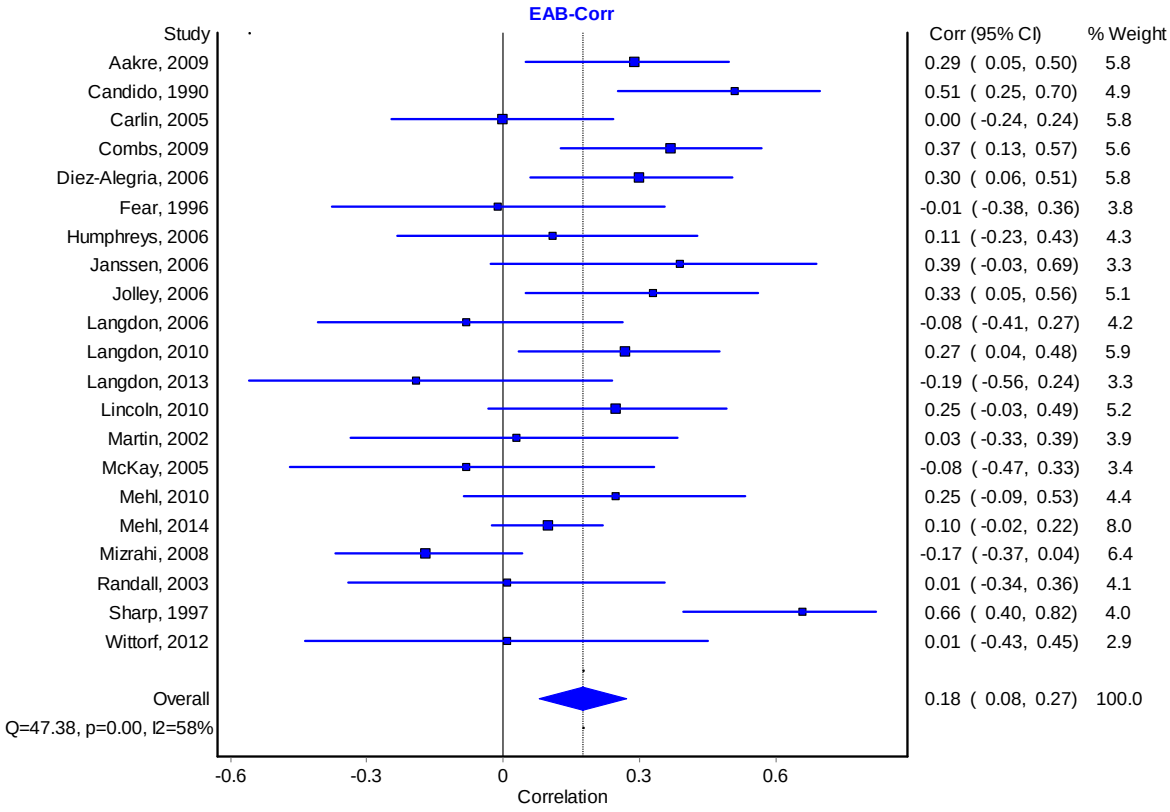


Fig. 2. Forest plots for analyses of externalising attributional bias (EAB). (A) Forest plot for comparison of EAB between people with psychosis with persecutory delusions (PDs) and healthy controls. (B) Forest plot for comparison of EAB between people with psychosis with PDs and people with depression. (C) Forest plot for comparison of EAB between people with psychosis with PDs and people with psychosis without PDs [and, if specified, grandiose delusions (GDs)]. (D) Forest plot of correlation between EAB and paranoia severity in people with psychosis.

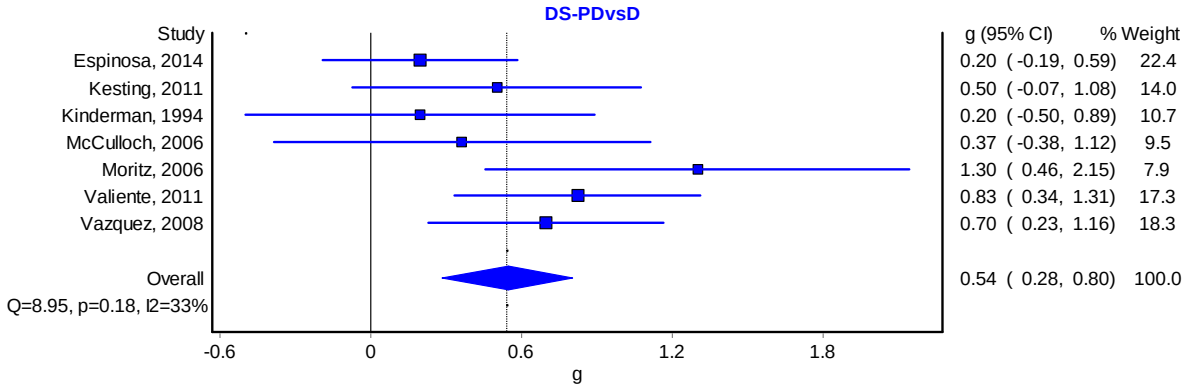


Fig. 3. Forest plot for comparison of discrepancy scores[a] between people with psychosis with persecutory delusions (PDs) and people with depression.

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

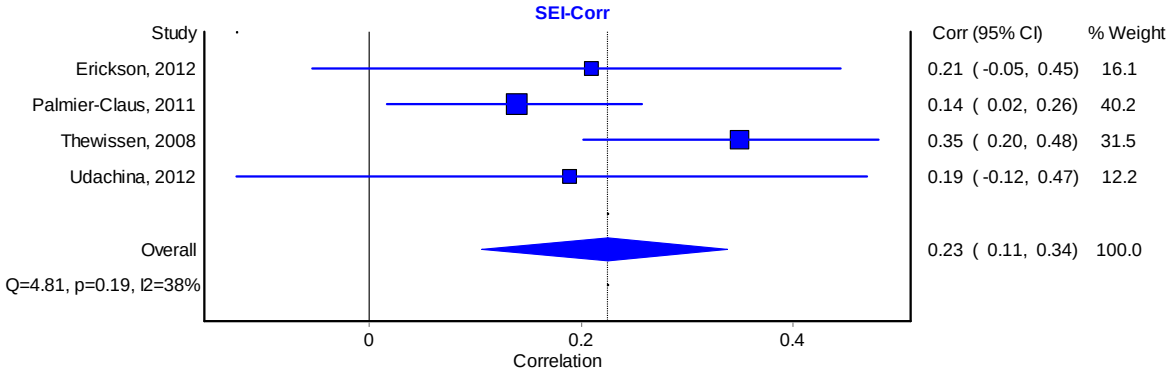


Fig. 4. Forest plot of correlation between self-esteem instability and paranoia severity in people with psychosis.

4. Discussion

4.1. Summary of Findings

The current study provided, to our knowledge, the first robust meta-analytical investigation of the widely-studied paranoia as defence model proposed by Bentall et al. (2001). Specifically, we conducted a meta-analysis and systematic review of 63 studies to test key predictions of this model.

We found a number of findings which were either consistent, inconsistent or inconclusive in relation to the paranoia as defence model and its predictions. With regard to model-consistent findings, moderate quality meta-analytical evidence showed support for the predictions regarding externalising attributional bias. Specifically, people with psychosis with persecutory delusions had a greater externalising attributional bias – in the large range – than people with depression. People with psychosis with persecutory delusions also had a small-moderately greater externalising attributional bias than healthy controls and people with psychosis without persecutory delusions. Moreover, there was a small positive correlation between paranoia severity and externalising attributional bias in people with psychosis. A particularly noteworthy finding was the moderate quality evidence that people with psychosis with persecutory delusions had a moderately greater discrepancy between implicit and explicit self-esteem (with the latter being higher) than people with depression. Consistent with this finding, people with psychosis with persecutory delusions had similar implicit self-esteem and greater explicit self-esteem – in the large range – compared to people with depression. People with psychosis with persecutory delusions also had small-moderately lower implicit self-esteem than healthy controls. While the evidence for this explicit self-esteem comparison was of moderate quality, the evidence for these implicit self-esteem comparisons was less reliable. Finally, there was high quality evidence of a small-moderate positive correlation between paranoia severity and self-esteem instability in people with psychosis.

In regards to model-inconsistent findings, high quality meta-analytical evidence showed that people with psychosis with persecutory delusions had lower explicit self-esteem – in the large range – than healthy controls. There was also high quality evidence of a small-moderate negative correlation between paranoia severity and explicit self-esteem in people with psychosis. Moreover, there was moderate quality evidence that people with psychosis with

persecutory delusions had similar explicit self-esteem to people with psychosis without persecutory delusions.

Regarding model-inconclusive findings, low quality meta-analytical evidence did not reveal a significant difference in implicit self-esteem between people with psychosis with and without persecutory delusions or a significant correlation between paranoia severity and implicit self-esteem in people with psychosis. However, only four studies with a relatively small number of participants (N = 167) reported data on these outcomes, thereby limiting any conclusions that might be drawn. Similarly, no significant difference in implicit-explicit self-esteem discrepancy between people with psychosis with and without persecutory delusions was observed, nor was there a significant correlation between paranoia severity and discrepancy scores in people with psychosis, but, once again, only four studies – with an even smaller number of participants (N = 165) – reported data on these outcomes. Moreover, there was no significant difference in implicit-explicit self-esteem discrepancy between people with psychosis with persecutory delusions and healthy controls, although the evidence for this comparison was very low in quality.

The results of the moderator analyses indicated the importance of considering the role of depression in the likelihood that people with psychosis with persecutory delusions demonstrated low explicit self-esteem compared to healthy controls. Indeed, when people with psychosis with persecutory delusions were more depressed, they also had lower explicit self-esteem. However, the between-study differences in depression did not completely explain the between-group differences in explicit self-esteem. Moreover, there was no evidence for the contribution of other tested moderators.

4.2. Discussion of Findings

We will now consider the merit of four different possible explanations for the findings above. The first possible explanation we will consider is that these findings are consistent with the 'strong' version of the paranoia as defence model. The strong version proposes that persecutory delusions successfully fulfil their defensive function and, as such, not only should people with psychosis with persecutory delusions have an externalising attributional bias but they should also have normal or high explicit self-esteem and low implicit self-esteem (Garety & Freeman, 1999). The second possible explanation we will consider is that these findings are consistent with the 'weak' version of the paranoia as defence model. In contrast to the strong version, the

weak version proposes that persecutory delusions only partially fulfil their defensive function and, as such, people with psychosis with persecutory delusions should simply have an implicit-explicit self-esteem discrepancy in addition to an externalising attributional bias (Garety & Freeman, 1999), which only partially protects explicit self-esteem. The third possible explanation we will consider is that these findings are consistent with the model by Freeman et al. (2002) which incorporates the attributional bias element of the paranoia as defence model but which suggests that persecutory delusions are a direct reflection of low self-esteem and associated emotional processes of the individual and not a defence. As such, people with psychosis with persecutory delusions should have both low implicit and explicit self-esteem without having an implicit-explicit self-esteem discrepancy. The fourth possible explanation we will consider is that both the weak version of the paranoia as defence model and the model by Freeman et al. (2002) are supported to varying degrees by these findings, and, as such, both models are required to make sense of them.

We do not believe that the findings above support the strong version of the paranoia as defence model. This explanation is refuted by the finding that people with psychosis with persecutory delusions had lower explicit self-esteem than healthy controls. This explanation is further contradicted by the findings that people with psychosis with persecutory delusions had lower explicit self-esteem than people with psychosis without persecutory delusions, and that there was a negative correlation between paranoia severity and explicit self-esteem in people with psychosis. These findings indicate that people with psychosis with persecutory delusions do not have normal or high explicit self-esteem, thereby refuting a central prediction of the strong version. It is worth noting that this conclusion is largely consistent with those of three previous systematic reviews (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014) and provides clear evidence that explicit self-esteem is skewed towards the negative in people with psychosis with persecutory delusions.

However, we believe our findings do provide support for the weak version of the paranoia as defence model. First, the findings that people with psychosis with persecutory delusions had a greater externalising attributional bias compared to healthy controls, people with depression and those with psychosis without persecutory delusions, as well as the finding of a positive correlation between paranoia severity and externalising attributional bias in people with psychosis, confirm the presence of the externalising attributional bias in people with psychosis with persecutory delusions, which is necessary to support the weak version. This is also particularly important given a previous systematic review concluded the evidence on such a

bias existing was inconsistent and divergent (Garety & Freeman, 2013). Second, people with psychosis with persecutory delusions had a greater implicit-explicit self-esteem discrepancy than people with depression, which is also necessary to support the weak version. Indeed, while people with psychosis with persecutory delusions had lower implicit and explicit self-esteem than healthy controls, they had similar implicit self-esteem and greater explicit self-esteem compared to people with depression. This is also particularly important given that three previous systematic reviews failed to identify such a discrepancy in people with psychosis with persecutory delusions (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014). Unlike these reviews, however, we were able to apply meta-analysis to this question, thus overcoming the power limitations of the individual studies. Overall, our findings are consistent with the weak version, which provides for scenarios where persecutory delusions only partially fulfil their defensive function. Indeed, given that people with psychosis with persecutory delusions had lower explicit self-esteem than healthy controls, it appears that persecutory delusions, which reflect an externalising attributional bias, do not fully preserve explicit self-esteem. However, it appears that they prevent explicit self-esteem from sinking to the even lower level of implicit self-esteem, as evidenced by the aforementioned implicit-explicit self-esteem discrepancy finding. Moreover, the finding that self-esteem instability was positively correlated with paranoia severity in people with psychosis also appears to be consistent with the weak version, as this provides a plausible explanation for some of the failures of the defence. It also provides a plausible explanation for the inconsistent results on the relationship between self-esteem and paranoia previously reported (Bentall et al., 2001; Garety & Freeman, 1999).

We also believe that the findings above support the model by Freeman et al. (2002). In particular, the findings that people with psychosis with persecutory delusions were characterised by both low implicit self-esteem (compared to healthy controls and people with depression) and low explicit self-esteem (compared to healthy controls and people with psychosis without persecutory delusions), as well as the finding of a negative correlation between paranoia severity and explicit self-esteem in people with psychosis, at least partially support the idea that persecutory delusions are a direct reflection of low self-esteem and associated emotional processes of the individual (Freeman et al., 2002). In addition, the results of the moderator analyses, which indicated that people with psychosis with persecutory delusions had lower explicit self-esteem if they were more depressed, may also lend partial support to this idea. Indeed, it has been argued that where depression and explicit self-esteem

are related in this way, this favours an account which invokes the role of 'normal emotional processes' (Freeman et al., 1998). However, the aforementioned implicit-explicit self-esteem discrepancy finding challenges the idea that no defence processes are activated, as proposed by the model of Freeman et al. (2002). Therefore, these findings, when considered in their totality, do not provide full support for Freeman et al. (2002), who claim that self-esteem has only a direct effect on paranoia. Perhaps, as with the paranoia as defence model, they support a 'weaker' version of this model.

In summary, we conclude that both the weak version of the paranoia as defence model and the model by Freeman et al. (2002) are required to make full sense of the findings above. While the weak version of the paranoia as defence model explains the externalising attributional bias findings, the low implicit self-esteem findings, the implicit-explicit self-esteem discrepancy finding and the self-esteem instability finding, the model by Freeman et al. (2002) has added explanatory power in terms of accounting for the low implicit and explicit self-esteem findings; these are not inconsistent with the weak version of the paranoia as defence model, but they are specifically predicted by the model of Freeman et al. (2002).

4.3. Strengths and Limitations

This study has a number of strengths. First, we conducted a meta-analysis of 63 studies, which enabled us to overcome the power limitations of individual studies and therefore reconcile inconsistent and divergent findings. Systematic reviews, which generally provide an overall picture of trends in significant and non-significant findings, are very limited in this respect, since many individual studies lack the power to detect small to moderate effects (due to resource constraints, etc.) (Borenstein, Hedges, Higgins, & Rothstein, 2009). Second, we employed a method for calculating the discrepancy between implicit and explicit self-esteem that allowed for the analysis of both within and between group differences. It has been argued that this is necessary to adequately test the hypothesis of discrepancy (Kesting et al., 2011; Vazquez et al., 2008), but the results of studies on discrepancies between implicit and explicit self-esteem reported in previous systematic reviews have been primarily based on the comparison of the results between groups for each type of self-esteem separately (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014). Third, we pre-registered our protocol in the public domain. As noted elsewhere (Booth et al., 2011; Quintana, 2015), systematic reviews and meta-analyses are susceptible to risks of selective reporting bias and

hypothesising after the results are known. While we made some changes to our protocol after registering it (largely due to new information and increasing quality and robustness), pre-registration ensures complete transparency about these, thereby allowing readers to judge for themselves whether they were driven by issues relating to new information, quality, robustness or bias. Fourth, our protocol was approved in advance by exponents of both the paranoia as defence model (RB) and the model by Freeman et al. (2002) (DF). This increased the likelihood of accurately testing the predictions of the paranoia as defence model, ensured a balanced perspective and reduced the risk of bias. Finally, we obtained unpublished data from 6 authors, thereby reducing the risk of publication bias. Inclusion of unpublished data is particularly important for systematic reviews and meta-analyses of observational studies given the greater threat of publication bias with observational research than other types of research (e.g., treatment effectiveness research) (Easterbrook, Berlin, Gopalan, & Matthews, 1991).

This study also has some limitations that should be taken into consideration. First, resource constraints meant that we were limited to English language studies. However, given the substantial number of studies included in the meta-analysis, we believe that it is unlikely that data excluded for this reason would have had a substantial impact upon the reported effect sizes. Second, our assessment of study methodological quality revealed that just over a third of the measures used to assess externalising attributional bias were only partially reliable and valid, primarily because they failed to distinguish between external-personal and external-situational attributions. This distinction is important because Bentall et al. (2001) postulated that people with psychosis with persecutory delusions make many external-personal attributions for negative events but few external-situational ones. Indeed, they hypothesised that external-personal attributions for negative events lead to paranoia but that external-situational ones are psychologically benign (Bentall et al., 2001). However, we decided, a priori, to adopt a deliberately inclusive approach for this meta-analysis, as has been recommended (Bernan & Parker, 2002). We adopted this inclusive approach because we believe the greater transparency, informational value and external validity justifies the potential disadvantages of increased conceptual and statistical heterogeneity. Third, there was an insufficient number of studies to carry out some of the planned moderator analyses and tests of publication bias. However, in many instances, we were able to check for publication bias and test for moderators of effect size including matching of groups on demographics and group differences in depression. Finally, while the meta-analytical evidence was of reasonable quality for most of the analyses, the evidence for the analyses regarding implicit self-esteem was less

reliable. This may have been influenced by the methodological problems related to the measurement of implicit self-esteem, as previously noted (Bosson, Swann, & Pennebaker, 2000; Kesting & Lincoln, 2014; Tiernan et al., 2014).

4.4. Recommendations

The attributions relevant to the paranoia as defence model that were explored in this study were external attributions for negative events. However, there are other arguably relevant attributions to the paranoia as defence model, specifically internal attributions for positive events (i.e., attributing positive events to oneself) (Bentall et al., 1994). Previously, it was argued that external attributions for negative events, especially when combined with internal attributions for positive events (i.e., self-serving bias), act to defend against the effects of low implicit self-esteem (Bentall et al., 1994) in the context of persecutory delusions. While previous systematic reviews found less evidence that people with persecutory delusions make internal attributions for positive events in comparison to external attributions for negative events (Garety & Freeman, 1999, 2013), meta-analytical investigation of the effect sizes related to internal attributions for positive events in people with persecutory delusions may now be useful to overcome the limitations of the reduced power of individual studies to detect effects.

A topic that has gained attention has been the hypothesis of two distinct types of paranoia: 'poor-me' and 'bad me' (Chadwick, Trower, Juusti-Butler, & Maguire, 2005; Trower & Chadwick, 1995). While people from both subgroups feel persecuted, they differ in their perceived deservedness of persecution. People with bad-me paranoia blame themselves and believe that their persecution is deserved, whereas those with poor-me paranoia believe that their persecution is undeserved and perceive others as bad. Relating to the paranoia as defence model, investigators have suggested that paranoia is a defence against low self-esteem reaching consciousness among people with poor-me rather than bad-me paranoia (Chadwick et al., 2005; Trower & Chadwick, 1995). While we were not able to test for the moderating effect of perceived deservedness of persecution, future meta-analyses may be useful to address this question. Preliminary evidence suggests that the externalising attributional bias is stronger among people with poor-me rather than bad-me paranoia (Melo, Taylor, & Bentall, 2006). Importantly though, the central test of the two types of paranoia has not been carried out: an examination of the difference in implicit-explicit self-esteem discrepancy between people with poor-me and bad-me paranoia. It would be important that such an examination employs a

method for calculating the discrepancy between implicit and explicit self-esteem that allows for the analysis of both within and between group differences, as per previous research (Kesting et al., 2011).

4.5. Clinical Implications

The finding of an externalising attributional bias in people with psychosis with persecutory delusions highlights a key target for psychological interventions. Different techniques can potentially modify the externalising attributional bias. Whereas Cognitive Behavioural Therapy (CBT) takes a 'front door approach' by attempting to directly challenge this bias (Beck & Rector, 2000), Metacognitive Training (MCT) takes a 'back door approach' by attempting to indirectly alter the metacognitive infrastructure related to this bias (Moritz & Woodward, 2007). Importantly though, studies have yet to confirm whether CBT, MCT or another psychological therapy can specifically modify the externalising attributional bias and whether such modification can reduce persecutory delusions and improve other treatment outcomes.

The finding that persecutory delusions can have a defensive function for people with psychosis suggests consideration about the optimal sequencing of interventions. Indeed, interventions which are designed to modify the externalising attributional bias, but do not first address the underlying low self-esteem, may risk causing a worsening of mood. To avoid causing harm, we recommend to improve self-esteem first before any attempt to modify the externalising attributional bias.

Surprisingly, we do not yet have brief focused interventions that are clearly effective in improving self-esteem in psychosis, let alone persecutory delusions. Although a number of trials have examined the effect of specifically targeting self-esteem in psychosis, change in this mechanism has either not been achieved (e.g., Lecomte et al., 1999; McCay et al., 2007; Schrank et al., 2015; Yanos, Roe, West, Smith, & Lysaker, 2012) or methodological problems with the trial has made interpretation difficult (e.g., lack of rater blinding; Hall & Tarrier, 2003). Although some trials of multi-component treatments have shown positive effects on self-esteem, lack of blinding (e.g., Gumley et al., 2006; Lysaker, Bond, Davis, Bryson, & Bell, 2005; O'Connor et al., 2007) and/or provision of a complex intervention which addresses a range of possible change mechanisms in addition to self-esteem (Barrowclough et al., 2006; Fung, Tsang, & Cheung, 2011; Leclerc, Lesage, Ricard, Lecomte, & Cyr, 2000; Tania Lecomte et al., 2008; Tarrier et al., 2014) makes it difficult to know what accounted for this change.

One recent single-blind trial (N = 30) did find a moderate to large benefit of a brief (8-week) focused intervention on the self-esteem of people with persecutory delusions, when compared to usual care alone at end of treatment. The intervention involved keeping a positive data log, reviewing strengths, normalising and challenge of negative thoughts and increasing positive activities. Although the effect of this on self-esteem was not significant when reassessed a month later, this may have been because this small trial had sufficient power to detect only large effects (Freeman et al., 2014).

Moreover, our findings suggest that we need to develop interventions that successfully modify implicit self-esteem in addition to explicit self-esteem. Trials of such interventions might consider measuring both implicit and explicit self-esteem as outcomes.

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Supplementary Appendix to:

Murphy, P., Bentall, R., Freeman, D., O'Rourke, S., Hutton, P. (in preparation). A systematic review and meta-analysis of the Attribution–Self-Representation model ('paranoia-as-defence') of persecutory delusions.

Content of Supplementary Appendix

A. Protocol

Title: Persecutory delusions and the attribution–self-representation cycle: protocol for a systematic review and meta-analysis.

Reviewers: Philip Murphy, Richard Bentall, Daniel Freeman, Paul Hutton

Review question(s)

Magnitude of externalising attributional bias:

1) Do individuals with non-affective psychosis with persecutory delusions have a greater externalising attributional bias than individuals with non-psychotic mental health problems?

2) Do individuals with non-affective psychosis with persecutory delusions have a greater externalising attributional bias than healthy individuals?

3) Do individuals with non-affective psychosis with persecutory delusions have a greater externalising attributional bias than individuals with non-affective psychosis without delusions?

4) Is there a positive correlation between persecutory delusion severity and the degree of externalising attributional bias?

Magnitude of explicit self-esteem:

5) Do individuals with non-affective psychosis with persecutory delusions have greater explicit self-esteem than individuals with non-psychotic mental health problems?

6) Do individuals with non-affective psychosis with persecutory delusions have greater explicit self-esteem than healthy individuals?

7) Do individuals with non-affective psychosis with persecutory delusions have greater explicit self-esteem than individuals with non-affective psychosis without delusions?

8) Is there a positive correlation between persecutory delusion severity and explicit self-esteem?

Magnitude of discrepancy between implicit and explicit self-esteem:

9) Do individuals with non-affective psychosis with persecutory delusions demonstrate a greater discrepancy between implicit and explicit self-esteem than individuals with non-psychotic mental health problems?

10) Do individuals with non-affective psychosis with persecutory delusions demonstrate a greater discrepancy between implicit and explicit self-esteem than healthy individuals?

11) Do individuals with non-affective psychosis with persecutory delusions demonstrate a greater discrepancy between implicit and explicit self-esteem than individuals with non-affective psychosis without delusions?

12) Is there a positive correlation between persecutory delusion severity and the magnitude of the discrepancy between implicit and explicit self-esteem?

Magnitude of fluctuation in self-esteem:

13) Do individuals with non-affective psychosis with persecutory delusions show greater self-esteem fluctuation than individuals with non-psychotic mental health problems?

14) Do individuals with non-affective psychosis with persecutory delusions show greater self-esteem fluctuation than healthy individuals?

15) Do individuals with non-affective psychosis with persecutory delusions show greater self-esteem fluctuation than individuals with non-affective psychosis without delusions?

16) Is there a positive correlation between persecutory delusion severity and self-esteem fluctuation?

Searches

A librarian experienced in database searches will be consulted on the search strategy which is yet to be finalised but will include the following databases: PsycINFO, MEDLINE, EMBASE and Web of Science.

Hand searches of references in eligible articles and key review articles will also be undertaken.

As a final step, all corresponding authors of included articles will be contacted and asked if they are aware of any further studies potentially meeting our criteria, including both recently published and unpublished studies.

Only English language studies will be included.

Types of study to be included

Case-control, cross-sectional correlational and prospective designs will be included. Baseline data from experimental designs and intervention trials may also be included; however, outcome data or data that has been manipulated in these types of studies will be excluded.

Condition or domain being studied

Non-affective psychosis, persecutory delusions and the attribution–self-representation cycle.

Participants/ population

Group comparison studies will be required to recruit a sample of individuals with non-affective psychosis (e.g., schizophrenia, schizoaffective disorder, schizophreniform disorder, psychosis NOS) where at least half of the sample have persecutory delusions. Correlational studies will also be required to recruit a sample of individuals with non-affective psychosis and to report correlational data between a measure of paranoia/persecutory ideation and the construct of interest.

Exclusion criteria include studies where over half of the sample have co-morbid diagnoses of an intellectual disability, bipolar disorder, a primary diagnosis of substance-induced psychosis or psychosis that is secondary to an organic pathology.

Intervention(s), exposure(s)

Not applicable.

Comparator(s)/ control

Both psychiatric and non-clinical controls will be included.

Context

No limitation on settings.

Outcome(s)

Primary outcomes

1) The first primary outcome is the magnitude to which external attributions for negative events are made. Attributions are typically measured via questionnaires such as the Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) and the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) but they have also been measured in other ways such as by coding the natural speech of participants (Craig et al., 2004). Included studies will be required to measure attributions in one of these ways or to employ a conceptually equivalent measure. In the event that a study contains more than one index of attributions, the following hierarchy will be used to decide on the order of preference for inclusion of indices of attributions: IPSAQ > ASQ. If a study does not contain one of these indices but contains a conceptual equivalent, this will be used as long as it meets minimal criteria for reliability and validity.

2) The second primary outcome is the magnitude of explicit self-esteem. (It is worth noting that a broad concept of self-esteem will be used, with self-esteem referring to views - positive or negative - about the self.) The most common explicit measure of self-esteem appears to be the Rosenberg Self-Esteem Scale (RSES; Lyon et al., 1994). Other explicit indices of self-esteem include the Multidimensional Self-Esteem Inventory (MSEI; O'Brien & Epstein, 1998), the Self-Concept Questionnaire (SCQ; Robson, 1989) and the 'positive self' and 'negative self' subscales of the Brief Core Schema Scale (BCSS; Fowler et al., 2006). Included studies will be required to include one of these explicit indices or a conceptual equivalent. In the event that a study contains more than one explicit index of self-esteem, the RSES will be the preference. If a study does not contain the RSES but contains a conceptual equivalent, this will be used as long as it meets minimal criteria for reliability and validity.

3) The third primary outcome is the magnitude of the discrepancy between implicit and explicit self-esteem. A variety of indices of implicit and explicit self-esteem have been employed. Some of the explicit indices of self-esteem are referred to above including the RSES. Commonly used implicit indices of self-esteem include the Implicit Association Task (IAT; Greenwald et al., 1998), the Emotional Stroop Task (Stroop, 1935; Williams et al., 1996) and the go/no-go association Task (GNAT; Nosek & Banaji, 2001). Included studies will be required to include one of these implicit indices (or a conceptual equivalent) and one of these explicit indices (or a conceptual equivalent) for a comparison to be made. In the event that a study contains more than one implicit index and/or more than one explicit index of self-esteem, the RSES will once again be the preference for the explicit indices whereas the following hierarchy will be used for the implicit indices: IAT > Emotional Stroop Task > GNAT. As above, conceptually equivalent variants, which meet minimal criteria for reliability and validity, will be used should a study not contain these indices.

4) The fourth primary outcome is the magnitude of fluctuation in self-esteem. To assess this, studies have primarily used the Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987) or have repeated the application of a self-esteem measure such as the RSES. Included studies will be required to assess self-esteem fluctuation in one of these ways. If an alternative method comes to light, it will be considered. Cross-sectional correlational studies, which have employed measures such as the Self-Esteem Instability Scale (SEIS; Raes & Gucht, 2009), will not be included. The same data extraction hierarchy will be used as above.

Secondary outcomes

None.

Data extraction, (selection and coding)

Selection of studies for the review will be conducted by the first author (Philip Murphy) against the inclusion/exclusion criteria. Decision-making will be recorded and checked with the study supervisor, Dr Paul Hutton.

Extracted data will include sample characteristics (e.g., gender, age, ethnicity, clinical diagnosis, stage of illness, sample source and location), study design, measure/s of externalising attributional style or self-esteem, and outcome data (e.g., means, standard deviations, proportions, correlations and regression weights where applicable).

If data is not reported in usable format, the relevant authors will be contacted initially. If they do not reply, effect sizes will be attempted to be derived from other statistics (e.g., t test values, P-values, F-values) using equations specified in the Cochrane Handbook or by Borenstein and colleagues.

The extraction of data where depression is adequately controlled for will be prioritised. Therefore, the following hierarchy will be used to decide on the order of data to be prioritised in the analyses: data of estimates involving a non-depressed persecutory-deluded group and a non-depressed control group > data of estimates involving a persecutory-deluded group (with varying or unspecified levels of depression) which have been adjusted for depression scores > data of estimates involving a depressed persecutory-deluded group and a depressed non-persecutory-deluded group > data of estimates involving a persecutory-deluded group (with varying or unspecified levels of depression) which have not been adjusted for depression scores. Any moderator analysis could then examine whether the estimates belonging to the last category are different from the estimates belonging to the first three categories.

Risk of bias (quality) assessment

A methodological quality assessment tool for observational research, adapted from one used by the Agency for Healthcare Research and Quality (AHRQ; Williams, Plassman, Burke, Holsinger, & Benjamin, 2010) will be used. In addition, the GRADE approach will be used to provide an assessment of quality at the outcome level. The GRADE approach will be adapted so that observational studies will not automatically be marked down for quality. This is because all studies included in the proposed review will be observational.

The reviewer carrying out the quality assessments will complete the GRADE online training (http://cebgrade.mcmaster.ca). Quality assessments will be presented descriptively to guide the interpretation of findings. In addition, specific aspects of methodology will be tested as moderators of effect sizes. These will include blinding and the matching of participants on demographics.

Strategy for data synthesis

Hedge's g will be used to determine effect sizes for group differences on continuous outcomes. Where studies provide multiple comparisons between a group of individuals with non-affective psychosis with persecutory delusions and two or more control groups, a single weighted effect size, taking into account the non-independence in the data, will be calculated and used in the meta-analyses. However, control groups will only be combined if it is reasonable to do so (e.g., if both groups are non-psychotic clinical groups, or both groups are non-clinical control groups). It would not be reasonable to combine certain control groups (e.g., a psychotic control group with a non-psychotic clinical control group, or a non-psychotic clinical control group with a non-clinical control group). In addition, comparisons with either psychiatric controls and non-clinical controls will be explored separately.

For the correlational analyses, Pearson's correlations will be converted into Fisher's Z. Spearman's correlations will first be converted into approximate Pearson's correlations.

Every effort will be made to transform any other reported data into usable metric, following procedures outlined in the Cochrane Handbook or by Borenstein and colleagues. For all effects, 95% confidence intervals will be calculated and statistical significance will be set at $P = 0.05$.

Publication bias will be tested for using funnel plots and applying the Trim and Fill method. Heterogeneity will be assessed via the Q-statistic and quantified via the I-squared statistic.

Random-effects meta-analyses will be undertaken as some degree of heterogeneity is expected across studies. Nonetheless, when there is less than moderate heterogeneity (i.e., I-squared statistic < 40%), a sensitivity analysis will be carried out to examine the difference between fixed-effects and randon-effects models.

Where it is not possible to perform a meta-analyses because of limited studies, a narrative review will be undertaken of the studies identified.

Analysis of subgroups or subsets

Depending on statistical power and number of studies, the moderators of effect size intended to be tested are as follows:

1) The stage of the psychosis (early psychosis vs. chronic psychosis);

2) Whether depression was controlled for;

3) The blinding of the researcher during the administration of the measure/s;

4) The matching of participants on demographics.

Dissemination plans

The completed review will be submitted for publication to a peer-reviewed journal.

Contact details for further information

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25 March 2016

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24 March 2017

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Not applicable

Conflicts of interest

None known

Language

English

Country

Scotland

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

Delusions; Humans; Paranoid Disorders; Self Concept; Self Psychology; Social Perception

Stage of review

Ongoing

Date of registration in PROSPERO

16 March 2016

Date of publication of this revision

16 March 2016

Stage of review at time of original submission	*Started*	*Completed*
Preliminary searches	Yes	No
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016032782

B. Changes from Protocol and Further Specifications

The review protocol was registered in advance with the PROSPERO International Prospective Register of Systematic Reviews (registration number: CRD42016032782). A subsequent change was the decision to compare people with psychosis with current persecutory delusions (PDs) to people with psychosis without PDs (and, if specified, grandiose delusions; GDs) rather than to people with psychosis without delusions in general. We made this decision on the basis that most of the research in this area had compared people with psychosis with current PDs to people with psychosis without PDs, irrespective of whether or not they had other current delusions; thus, restricting our analyses to what we had originally planned would have meant that we would have had to exclude data from many group comparisons. However, we felt that it was important to exclude data from group comparison analyses when it was specified that 50% or more of the people with psychosis without PDs had GDs, given queries whether different aspects of the paranoia as defence model (Bentall et al., 2001) including the externalising attributional bias may be attributable to unassessed grandiosity (Garety & Freeman, 2013).

Another change was the decision to restrict non-psychotic psychiatric controls to people with depression, as the predictions of the paranoia as defence model relate to, among others, group differences between people with psychosis with PDs and people with depression; indeed, predictions have not been made about group differences between people with psychosis with PDs and other non-psychotic psychiatric controls (e.g., people with anorexia nervosa or an anxiety disorder). It should be noted that only two studies in total (both of which belonged to the externalising attributional bias domain) contained both people with depression and another non-psychotic psychiatric control group (i.e., all the non-psychotic psychiatric control groups in the other studies contained people with depression) and this change made no substantive difference to the results.

Additional changes included abandoning the 'data extraction hierarchy' that was intended to prioritise the extraction of data where depression was adequately controlled and instead using meta-regression to assess whether group differences in depression (the standardised mean difference, d, was computed from group means and associated SDs related to depression to quantify the degree to which groups differed in depression) moderated the different effect sizes. However, we still decided that we would prioritise data from certain group comparisons for the analyses. Specifically, if a study contained both a depressed PD group and a non-depressed PD group, we decided the non-depressed PD group would take precedence over the depressed PD group for the relevant analysis. This enabled us to remove the potential confounding effect of depression from this analysis, and is consistent with our decision specified in our protocol to prioritise the extraction of data where depression was adequately controlled.

Moreover, another change was our decision to check for publication bias using Doi plots as these are more sensitive than funnel plots (Barendregt & Doi, 2016).

Further specifications included examining group differences and correlations in implicit self-esteem and developing the data extraction procedures with regard to externalising attributional bias and explicit self-esteem; none of these specifications were inconsistent with our original protocol.

Our subsequent planned analyses regarding implicit self-esteem were consistent with our hypotheses related to the discrepancy between implicit and explicit self-esteem as per our protocol. However, they allowed us to highlight the direction of any discrepancies (e.g., whether implicit self-esteem was lower or higher than explicit self-esteem) as well as, more specifically, the magnitude of any implicit self-esteem differences.

Regarding externalising attributional bias, we have specified and justified our 'data extraction hierarchy' elsewhere (Appendix E). We also provided a rationale for prioritising participants' self-ratings over independent judges' ratings as to the extent to which participants' attributional statements represented an externalising/internalising attributional bias. Moreover, we provided a rationale for prioritising negative explicit self-esteem over positive explicit self-esteem if a total explicit self-esteem score was not reported or easily calculated.

Finally, we abandoned two planned moderator analyses (namely, the blinding of the outcome assessor and the stage of psychosis) and the group comparisons in relation to self-esteem instability due to insufficient data. We made all of these decisions prior to analyses being undertaken.

C. Search Strategy

We started by assessing for eligibility studies identified in three previous systematic reviews of the relevant literature published in 2013 and 2014 (Garety & Freeman, 2013; Kesting & Lincoln, 2013; Tiernan et al., 2014).

In relation to the 2013 systematic review by Garety and Freeman (2013), they reported using three search techniques for studies related to delusions and the paranoia as defence model (Bentall et al., 2001). First, they searched the Web of Science and PubMed databases using the following search terms: "attribution bias" AND ("delusions" or "paranoia" or "schizophrenia"); ("self esteem" or "overt self esteem" or "covert self esteem" or "explicit self esteem" or "implicit self esteem" or "brief core schema scale") AND ("delusions" or "paranoia" or "schizophrenia"). Second, they consulted three widely cited review articles on delusions (Bell, Halligan, & Ellis, 2006; Freeman, 2007; Garety & Freeman, 1999). Third, they manually searched early view articles in the following journals: *Schizophrenia Bulletin; Schizophrenia Review; British Journal of Clinical Psychology; Behaviour Research and Therapy; Journal of Behavioural Therapy and Experimental Psychiatry; Psychological Medicine; Journal of Abnormal Psychology; Psychiatry Research.*

With regard to the 2013 systematic review by Kesting and Lincoln, they reported using two main search strategies for studies related to self-esteem and persecutory delusions (PDs). First, they searched the PsycINFO and Ovid MEDLINE(R) databases in March 2012 using the following search terms: ("self-esteem" or "self-worth" or "self-concept" or "schema*") AND ("paranoia*" or "delus*" or "delud*" or "persecut*" or "suspicious*"). Second, they consulted three widely cited review articles on delusions (Bentall et al., 2001; Freeman, 2007; Garety & Freeman, 1999).

In the 2014 systematic review by Tiernan et al., they searched for studies related to self-esteem and PDs. Specifically, they searched the PsycINFO, Web of Science and MEDLINE databases from 2001-2012 using Boolean operators ("AND" and "OR") and combinations of the following search terms: "parano*", "persecut*", "psychosis", "psychotic", "schizophrenia", "delusion*", "self*", "schema*", "belief*", "self-esteem", "self-representation", "self-concept", "self-consciousness", "representation" and "concept".

We then searched PsychINFO, MEDLINE, EMBASE and Web of Science for studies published between 2012 and 10th September 2016 using the following terms:

("attribution bias*" or "attributional bias*" or "externalising bias*" or "externalizing bias*" or "personalising bias*" or "personalizing bias" or "self-serving bias*" or "self-esteem" or "self-worth" or "self-concept" or "schema") AND ("psychosis" or "psychotic" or "schizo*" or "delusion*" or "paranoi*" or "persecut*").

We subsequently searched the reference lists of all included full-text articles to identify any studies missed in the initial search. In every case where useable but unpublished data were thought to exist we contacted the relevant authors. As a final step, we contacted all corresponding authors of included studies for any further unpublished data.

D. Excluded Studies

The following table (**Table D.1)** details studies or reports excluded after inspection of the full-text report, or via correspondence with authors. Studies or reports excluded on basis of title or abstract alone are not detailed as these are too numerous and the vast majority were of different conditions or were otherwise unrelated to the review question.

Study Ref	Reason for Exclusion
Addington & Tran, 2009	Sample not suitable
An et al., 2010	No useable index of externalising attributional bias or self-esteem
Barrowclough et al., 2003	No useable index of paranoia/ persecutory ideation for correlational analysis
Beese & Stratton, 2004	Sample not suitable
Bentall & Kaney, 1996	No useable index of externalising attributional bias or self-esteem
Bentall et al., 2009	Cannot be used in analyses due to re-use of same sample/participants
Bowins & Shugar, 1998	Useable data not provided or made available upon request
Cantero, Duque, Valiente, Fuentenebro, & Villavicencio, 2012	No full-text available
Cella, Swan, Medin, Reeder, & Wykes, 2014	No useable index of paranoia/ persecutory ideation for correlational analysis
Chadwick, Trower, Juusti-Butler, & Maguire, 2005	Sample not suitable
Ciufolini et al., 2015	Sample not suitable
Craig, Hatton, Craig, & Bentall, 2004	Useable data not provided or made available upon request
Drake et al., 2004	No useable cross-sectional data
Ellett, Freeman, & Garety, 2008	No useable cross-sectional data
Fowler et al., 2006	Sample not suitable
Fowler et al., 2012	Cannot be used in analyses due to re-use of same sample/participants
Fraguas et al., 2008	Useable data not provided or made available upon request
Freeman, Garety, & Kuipers, 2001	No useable index of paranoia/ persecutory ideation for correlational analysis
Harris, Oakley, Reichenberg, Murphy, & Picchioni, 2012	No full-text available
Kaney & Bentall, 1989	Cannot be used in analyses due to re-use of same sample/participants
Katsura et al., 2012	No full-text available
Kinderman, Kaney, Morley, & Bentall, 1992	Cannot be used in analyses due to re-use of same sample/participants
Kinderman & Bentall, 1996	No useable index of externalising attributional bias or self-esteem
Krstev, Jackson, & Maude, 1999	Useable data not provided or made available upon request

Study Ref	Reason for Exclusion
Kumar, & Mohanty, 2016	No useable index of paranoia/ persecutory ideation for correlational analysis
Ludtke, Kriston, Schroder, Lincoln, & Moritz (in press)	No useable index of externalising attributional bias or self-esteem
Moorhead, Samarasekera, & Turkington, 2005	No useable index of externalising attributional bias or self-esteem
Nakamura et al., 2015	Sample not suitable
Paget & Ellet, 2014	No useable index of paranoia/ persecutory ideation for correlational analysis
Sitko et al., 2016	No useable index of externalising attributional bias or self-esteem
Smith et al., 2006	Cannot be used in analyses due to re-use of same sample/participants
So, Tang, & Leung, 2015	Sample not suitable
Stowkowy & Addington, 2012	Sample not suitable
Taylor et al., 2014	Sample not suitable
Thewissen et al., 2011	Cannot be used in analyses due to re-use of same sample/participants
Udachina, Varese, Myin-Germeys, & Bentall, 2014	No useable cross-sectional data
Valiente, Cantero, Sanchez, Provencio, & Wickham, 2014	Cannot be used in analyses due to re-use of same sample/participants
Valiente, Provencio, Espinosa, Duque, & Everts, 2015	No useable index of paranoia/ persecutory ideation for correlational analysis
Weinberg et al., 2012	No useable index of paranoia/ persecutory ideation for correlational analysis
Young & Bentall, 1997	No useable index of externalising attributional bias or self-esteem

E. Data Extraction Hierarchies/Procedures

Our first primary outcome was the magnitude to which negative events were attributed to external causes, especially other people (i.e., externalising attributional bias). With regard to this, the following 'data extraction hierarchy' (which specifies what data is preferable, and what data would be used if this could not be acquired) was chosen: (a) the external-personal attribution score for negative events (a measure of the tendency to attribute negative events to other people – rather than to oneself or situational factors) > (b) the personalizing bias score (PB) (a measure of the tendency to attribute negative events to other people rather than to situational factors) > (c) the internality attribution score for negative events (a measure of the tendency to attribute negative events to oneself – rather than to other people or situational factors) > (d) the externalising bias score (EB) (a measure of the tendency to attribute negative, as opposed to positive events, to external causes – either to other people or situational factors).

We chose the data extraction hierarchy above because we wanted to extract data as closely related as possible to the prediction of the paranoia as defence model that people with psychosis with current persecutory delusions (PDs), compared with the various controls, are more likely to make external-personal attributions for negative events in preference for either internal attributions or external-situational attributions (Bentall et al., 2001).

The rationale for deciding A and B should take precedence over C and D was that C and D fail to distinguish between external-personal and external-situational attributions. This distinction is particularly important because Bentall et al. (2001) postulate that people with psychosis with current PDs make many external-personal attributions for negative events but few external-situational ones. Indeed, they hypothesize that external-personal attributions for negative events lead to paranoia but that external-situational ones are psychologically benign – *"neither priming negative self-representations nor negative perceptions of others' attitudes toward the self"* (Bentall et al., 2001, p. 1169).

We decided A should take precedence over B because if a group scored higher on A we can be certain that their sum of both internal attributions and external-situational attributions for negative events was less – this increased tendency to make external-personal attributions for negative events (in preference for either internal attributions or external-situational attributions) is consistent with the prediction of the paranoia as defence model above. Regarding B, we can be certain that if a group scored higher on B they made more external-personal rather than external-situational attributions for negative events, but we cannot be certain that their sum of both internal attributions and external-situational attributions for negative events was less.

We decided C should take precedence over D because our focus was on the magnitude to which negative events were attributed to external causes (especially to other people) and, as noted by Garety and Freeman (1999), D (which is a composite difference score calculated by subtracting attributional style for negative events from attributional style for positive events) does not permit inferences separately on internality/externality for positive and negative events – indeed, it is actually possible for a group to score higher on D (i.e., externalise negative events to a greater degree than positive events) but still make fewer external attributions for negative events. Moreover, D has been criticised on the grounds that attributional styles for positive and negative events show a low degree of correlation and therefore it has been argued that attributions for positive and negative events should be treated separately (Byrne & MacLeod, 1997).

In our original protocol, we had also made the decision to choose the Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) (which can be used to calculate all four indices in the hierarchy above) over the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) (which can only be used to calculate the bottom two indices in the hierarchy above) if a study contained both of these measures. The rationale for this decision was based on the superior reliability of the subscales of the IPSAQ over the ASQ (Bentall et al., 2001).

Moreover, we decided to prioritise participants' self-ratings over independent judges' ratings as to the extent to which participants' attributional statements represented an externalising/internalising attributional bias.

Bentall et al. (2001, p. 1157). had previously stated the following on this matter: *"Unfortunately, it is not obvious which type of rating – by the individual who makes the attributional statement or by an independent judge – is most meaningful, as self-ratings may reflect self-presentation biases and*

independent ratings may be adversely affected by the failure to take into account background information known but not articulated by the participant."

In the absence of guidance by Bentall et al. (2001), we decided to prioritise self-ratings over independent judges' ratings, as the attributional style measures including the ASQ and IPSAQ were originally designed so that participants' attributional statements would be self-rated, and the psychometric properties of independent judges' ratings have not been subsequently tested. Our decision also took into account that, unlike self-ratings, independent judges' ratings were often blind to participant group status. In other words, we felt that a lack of support for the psychometric properties of independent judges' ratings was a more serious violation/limitation than the lack of blinding with regard to self-ratings.

Our second primary outcome was the magnitude of explicit self-esteem, which was assessed in the first instance by the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965); if data from this scale were not available, we used a conceptually equivalent variant. We prioritised the RSES as this is the most commonly used measure of explicit self-esteem and has been shown to have good internal consistency in individuals with serious mental health problems (Corrigan, Rafcaz, & Rusch, 2011; Corrigan, Watson, & Barr, 2006). Moreover, it is worth noting that we used a broad concept of self-esteem, with self-esteem referring to views – positive or negative – about the self.

We had also made the decision to prioritise negative explicit self-esteem over positive explicit self-esteem if a total explicit self-esteem score was not reported or easily calculated. Our rationale for this decision was based on the prediction of the paranoia as defence model that, if PDs are truly successful, they would prevent negative thoughts about the self from entering consciousness (Bentall et al., 2001) (thus, negative explicit self-esteem would be expected to be low). Moreover, if negative explicit self-esteem is high, it has been argued that this would be salient regardless of high positive explicit self-esteem (Garety & Freeman, 1999).

Our third primary outcome was the magnitude of implicit self-esteem, which was derived using a measure pertaining to the following 'data extraction hierarchy': the Implicit Association Task (IAT; Greenwald et al., 1998); the Emotional Stroop Task (EST; Stroop, 1935; Williams et al., 1996); the Go/No-go Association Task (GNAT; Nosek & Banaji, 2001). If data from one of these measures were not available, we used a conceptually equivalent variant. We decided the IAT would take precedence over the EST and the GNAT because it is considered to be the best measure of implicit self-esteem currently available (Bosson, Swann, & Pennebaker, 2000). We decided the EST would take precedence over the GNAT because it has been more commonly used and its psychometric properties have been more fully explored (Bosson et al., 2000).

Our fourth primary outcome was the magnitude of the discrepancy between implicit and explicit self-esteem (i.e., discrepancy score). This was calculated from the choice of implicit and explicit self-esteem indices above using a novel method (reported in Appendix F), unless this was already reported.

Finally, our fifth primary outcome was the magnitude of self-esteem instability, which was assessed by the Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987) or the repeated application a self-esteem measure such as the RSES. We had not prespecified which one of these methods would take precedence over the other in our original protocol, nor did we subsequently have to make this decision as no eligible study contained both of these methods.

F. Method for Calculating Discrepancy Scores

The results of studies on discrepancies between implicit and explicit self-esteem have been based on the comparison of the results between groups for each type of self-esteem separately, with two notable exceptions (Kesting et al., 2011; Vazquez et al., 2008). However, it has been argued that to adequately test the hypothesis of discrepancy, it is necessary to analyze the difference between implicit and explicit self-esteem within each group as well as differences between groups (Kesting et al., 2011; Vazquez et al., 2008).

Only one of the eligible studies (Kesting et al., 2011) adequately reported scores on discrepancies between implicit and explicit self-esteem for each group (i.e., discrepancy scores) that we could use for our group comparison analyses. In this study, Kesting et al. (2011) firstly z-standardised levels of implicit and explicit self-esteem for each participant (to a mean of 0 and SD of 1) so these would be directly comparable. To explore whether the groups differed in their discrepancy scores, they then subtracted z-scores in implicit self-esteem from z-scores in explicit self-esteem for each participant following which group means and associated SDs were calculated (positive scores indicated higher explicit than implicit self-esteem).

As we considered the approach that Kesting et al. (2011) adopted to be optimal, we firstly contacted the authors of the other eligible studies for their individual study data so we could calculate discrepancy scores accordingly. Only McKay et al. (2007) were able to provide the requested data. However, we were able to develop a method for calculating discrepancy scores from the group means and associated SDs related to implicit and explicit self-esteem (as well as some other related statistics if reported) in the other studies, which allowed us to explore within and between group differences. Two of us (PM and PH) independently calculated these discrepancy scores following which any disagreements were resolved. We subsequently tested our method for calculating discrepancy scores against the discrepancy scores derived from the individual study data of Kesting et al. (2011) and McKay et al. (2007): the standardised mean differences (SMDs) (d) in discrepancy scores for each group comparison were either identical or almost identical when comparing both approaches, which we believe attests to the validity of our method. Below we describe our method followed by our aforementioned tests.

Method

1. As implicit and explicit self-esteem were generally measured on different scales we firstly had to make the means and SDs for implicit and explicit self-esteem onto the same scale. To do this, we took advantage of the assumptions that underlie the SMD (i.e., the ratio of mean to SD is meaningful if the underlying distribution is normal) and did the following:

1.1. We referred to the mean explicit self-esteem for each group as *E-M* and the associated SD as *E-SD*. We then referred to the mean implicit self-esteem for each group as *I-M* and the associated SD as *I-SD*.

1.2. Using the method described in the Cochrane Handbook (Higgins & Green, 2011), we calculated the weighted mean of *E-M* across all groups (*mean E-Ms*). We also calculated the weighted mean of *E-SD* across all groups (*mean E-SDs*). We then calculated the ratio of *mean E-Ms* to *mean E-SDs.* E.g., if *mean E-Ms* was 20 and *mean E-SDs* was 4, then the ratio was 5.

1.3. We calculated the weighted mean of *I-M* across all groups (*mean I-Ms*). We also calculated the weighted mean of *I-SD* across all groups (*mean I-SDs*). We then calculated the ratio of *mean I-Ms* to *mean I-SDs.* E.g., if *mean I-Ms* was 1 and *mean I-SDs* was 0.5, then the ratio was 2.

1.4. We calculated what value of *mean I-Ms* would be required to change the *mean I-Ms: mean I-SDs* ratio to match the *mean E-Ms: mean E-SDs* ratio, keeping *mean I-SDs* the same [i.e., what value of *mean I-Ms* (or *X*) would mean (*X*/*mean I-SDs*) = (*mean E-Ms/mean E-SDs*). In this case, (*X*/0.5) = (20/4); 0.5 multiplied by 20 = 10; 10 divided by 4 = 2.5; *X* = 2.5.

1.5. We calculated the ratio of *mean E-Ms* to the value of *mean I-Ms* calculated in Step 1.4. In this case, 20/2.5 = 8.

1.6. Separately, for each group, we multiplied the original *I-M* by the ratio calculated in Step 1.5, as well as the original *I-SD* by the ratio calculated in Step 1.5. This yielded the rescaled values of *I-M* and

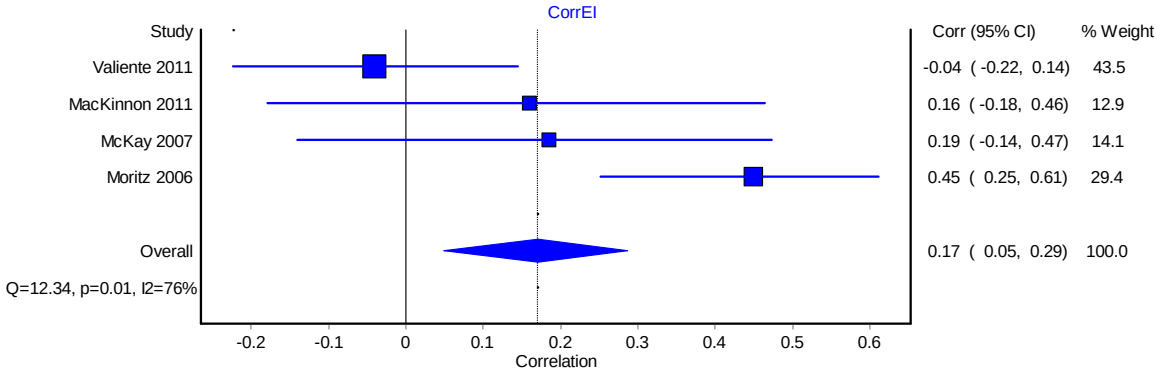
I-SD for each group. We then checked that the ratio between the rescaled *I-M* and *I-SD* values were the same as the ratio between the original ones.

2. Having made the means and SDs for implicit and explicit self-esteem onto the same scale, we then computed the mean discrepancy score for each group by simply subtracting the mean implicit self-esteem score from the mean explicit self-esteem score.

3. In the next step, we calculated the SD that was associated with each mean discrepancy score using the following approach:

3.1. We calculated the SD by following the calculations listed in part 2 of the instructions available here from the Cochrane Handbook (Higgins & Green, 2011), (replacing 'baseline' and 'final' with our two variables – i.e.., explicit and implicit self-esteem).

3.2. As part of Step 3.1 we needed to find or estimate the value of 'Corr'. Corr was just the correlation between explicit and implicit self-esteem within the group. It did not tell us anything about the differences in means of explicit and implicit self-esteem, but rather it quantified the degree to which the pattern of responses to both measures were similar, or whether there was a lot of variance. If the pattern was similar, Corr was high; if dissimilar, then Corr was low. As Corr was only reported in four of the eligible studies, we ran a meta-analysis of the reported correlations between explicit and implicit self-esteem and then replaced any missing estimates of Corr with the meta-analytical estimate, which was 0.17; see below.



Having completed the above, we had a mean discrepancy score and associated SD for each group. We were then able to enter these into the meta-analyses to test our different hypotheses.

Tests

As mentioned, we subsequently tested our method for calculating discrepancy scores against the discrepancy scores derived from the individual study data of Kesting et al. (2011) and McKay et al. (2007).

1. Regarding Kesting et al. (2011), they reported the following discrepancy scores for acute deluded (AD), remitted deluded (RD), healthy (HC) and depressed (DC) participants using their method described above:

	AD (*n* = 28)	RD (*n* = 31)	HC (*n* = 59)	DC (*n* = 21)
Discrepancy scores (Z-RSES – Z-IAT); mean (SD)	–0.24 (1.21)	–0.23 (1.47)	0.55 (1.17)	–0.84 (1.12)

Abbreviations: IAT, Implicit Association Task; RSES, Rosenberg Self-Esteem Scale.

The SMDs (d) in discrepancy scores for each group comparison were as follows:

	D	95% CI
AD vs RD	–0.01	–0.52 to 0.50
AD vs HC	–0.67	–1.13 to –0.21
AD vs DC	0.51	–0.06 to 1.09

Using our method, we then calculated discrepancy scores from the reported group means and associated SDs related to implicit and explicit self-esteem as well as Corr:[a]

	AD (*n* = 28)	RD (*n* = 31)	HC (*n* = 59)	DC (*n* = 21)
RSES; mean (SD)	18.93 (5.21)	18.29 (5.98)	25.12 (3.53)	17.57 (6.47)
IAT; mean (SD)	0.50 (0.33)	0.45 (0.44)	0.60 (0.40)	0.64 (0.29)
Corr[1]	0.17	0.17	0.17	0.17
Discrepancy scores; mean (SD)	11.05 (6.71)	11.20 (8.35)	15.66 (6.68)	7.48 (7.26)

Abbreviations: IAT, Implicit Association Task; RSES, Rosenberg Self-Esteem Scale. [a]Corr was the correlation between explicit and implicit self-esteem, which was used for the calculation of the SD associated with the mean discrepancy score. As it was not reported in this study, we used the meta-analytical estimate.

The SMDs (d) in discrepancy scores for each group comparison were as follows:

	D	95% CI
AD vs RD	–0.02	–0.53 to 0.49
AD vs HC	–0.69	–1.15 to –0.23
AD vs DC	0.51	–0.06 to 1.09

As can be seen above, the SMDs (d) in discrepancy scores for each group comparison were either identical or almost identical when comparing both approaches.

2. Regarding McKay et al. (2007), as they provided us with their individual study data, we were able to calculate the following discrepancy scores for patients with current PDs, patients with remitted PDs, and healthy controls (HCs) using the method adopted by Kesting et al. (2011):

	Current PDs (*n* = 9)	Remitted PDs (*n* = 9)	HCs (*n* = 19)
Discrepancy scores (Z-RSES – Z-IAT); mean (SD)	–0.05 (1.41)	0.09 (0.99)	0.01 (1.30)

Abbreviations: IAT, Implicit Association Task; RSES, Rosenberg Self-Esteem Scale.

The SMDs (d) in discrepancy scores for each group comparison were as follows:

	D	95% CI
Current PDs vs Remitted PDs	–0.11	–1.04 to 0.81
Current PDs vs HCs	–0.05	–0.84 to 0.75

Using our method, we then calculated discrepancy scores from the group means and associated SDs related to implicit and explicit self-esteem as well as Corr:[a]

	Current PDs (n = 9)[b]	Remitted PDs (n = 9)[b]	HCs (n = 19)[b]
RSES; mean (SD)	2.66 (0.64)	3.32 (0.26)	3.16 (0.45)
IAT; mean (SD)	74.08 (73.18)	173.78 (74.38)	153.06 (87.29)
Corr[1]	0.36	0.36	0.01
Discrepancy scores; mean (SD)	2.22 (0.63)	2.29 (0.42)	2.25 (0.68)

Abbreviations: IAT, Implicit Association Task; RSES, Rosenberg Self-Esteem Scale. [a]Corr was the reported correlation between explicit and implicit self-esteem, which was used for the calculation of the SD associated with the mean discrepancy score. [b]Only participants who completed both measures were included in the analyses.

The SMDs (d) in discrepancy scores for each group comparison were as follows:

	D	95% CI
Current PDs vs Remitted PDs	–0.13	–1.06 to 0.79
Current PDs vs HCs	–0.05	–0.84 to 0.75

Once again, as can be seen above, the SMDs (d) in discrepancy scores for each group comparison were either identical or almost identical when comparing both approaches.

G. Moderators: Operational Definitions

We examined two prespecified methodological moderators of effect size: (a) matching of groups on demographics; (b) group differences in depression.

With regard to the first moderator, we used the ratings in relation to the second criterion of our study quality assessment tool; see below.

2. Selection minimizes baseline differences in prognostic factors?

○ *Is the comparison group matched with the clinical group on key demographics [age, gender, education (or IQ or a measure of intelligence if education is not reported), ethnicity]?*

No = a standardised mean difference (SMD)(d) of ≥ 0.3 on at least 2; Partial = d of ≥ 0.3 on 1; Yes = d of < 0.3 on 4 or 3 excluding ethnicity

Specifically, if a group comparison received a *'no'* rating on this criterion, we categorised the groups as unmatched on demographics (as this moderator was binary, 0 = unmatched), whereas if a group comparison received a *'partial'* or *'yes'* rating on this criterion, we categorised the groups as matched on demographics (1 = matched). If a group comparison received an *'unclear'* rating on this criterion, we excluded this from the moderator analysis.

Regarding the second moderator, the SMD (d) was computed from group means and associated SDs related to depression to quantify the degree to which groups differed in depression.

H. Table H.1. Summary of Characteristics of the 63 Included Studies

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Aakre, 2009	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder) with PDs	18	External-personal attribution score for negative events (speech samples were coded using LACS)	USA	37.89 (10.82)	12/18 (67%)
	2. Outpatients with psychosis (as above) with remitted PDs	30			36.57 (9.15)	23/30 (77%)
	3. Outpatients with psychosis (as above) with remitted delusions which were non-persecutory	17			35.59 (8.01)	8/17 (47%)
	4. Healthy controls	29			37.66 (7.98)	19/29 (66%)
Bentall, 1991	1. Inpatients and outpatients with psychosis (paranoid schizophrenia or delusional disorder) with PDs	17	External-personal attribution score for negative events (when presented with low DCC information) (SAQ)	UK	34.8 (13.33)	11/17 (65%)
	2. Mostly patients with depression (major depressive disorder)	17			39.82 (16.35)	11/17 (65%)
	3. Healthy controls	17			34.8 (13.64)	11/17 (65%)
Bentall, 2005	1. Inpatients and outpatients with psychosis (paranoid schizophrenia or delusional disorder) with PDs	16	Internality attribution score for negative events (Expanded ASQ)	UK	33.37 (9.82)	14/16 (88%)
	2. Inpatients and outpatients with depression (major affective disorder)	16			36.93 (10.98)	14/16 (88%)
	3. Healthy controls	16			35.68 (12.63)	14/16 (88%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Bentall, 2008	1. Inpatients and outpatients with psychosis (schizophrenia, schizoaffective disorder or delusional disorder) with PDs	39	Negative explicit self-esteem score (SERS negative subscale) Paranoia score (FPS)	UK	33.95 (8.38)	26/39 (67%)
	2. Inpatients and outpatients with psychosis (schizophrenia spectrum disorder) with remitted PDs	29			34.66 (10.35)	18/29 (62%)
	3. Inpatients and outpatients with depression (major depression without PDs)	27			48.37 (10.97)	9/27 (33%)
	4. Healthy controls	33			39.03 (13.96)	14/33 (42%)
Ben-Zeev, 2009	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder)	194	Explicit self-esteem score (SERS-SF) Paranoia score (PS)	USA	Not reported	Not reported
Berry, 2015	1. Inpatients with psychosis (paranoid schizophrenia) with PDs	25	External-personal attribution score for negative events (IPSAQ)	UK	32.32 (9.25)	17/25 (68%)
	2. Healthy controls	25			31.88 (11.54)	17/25 (68%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Candido, 1990	1. Inpatients and outpatients with psychosis (paranoid schizophrenia or paranoid disorder) with PDs and no concomitant signs of depression	15	Internality attribution score for negative events (ASQ; 60-item version) Explicit self-esteem score (CSEI)	Canada	37.47 (11.89)	12/15 (80%)
	2. Inpatients and outpatients with psychosis (as above) with PDs and significant depressive symptoms (this group was just used for the correlational analysis)	15	Paranoia score (Paranoia Scale of the MMPI)		37.47 (13.65)	10/15 (67%)
	3. Inpatients and outpatients with depression (major unipolar depression) with no significant paranoid symptoms	15			41.93 (11.63)	10/15 (67%)
Carlin, 2005	1. Forensic inpatients with psychosis (mostly schizophrenia) with PDs	31	External attribution score for negative events (BAI-R)	UK	Entire sample: 34 (11)	Entire sample: 73/82 (89%)
	2. Forensic inpatients with psychosis (as above) without PDs	34				
Collett, 2016	1. Patients with non-affective psychosis with PDs	21	Explicit self-esteem score (RSES)	UK	45.6 (12.1)	10/21 (48%)
	2. Healthy controls	21			41.9 (12.2)	10/21 (48%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Combs, 2009	1. Inpatients with psychosis (schizophrenia) with PDs	32	PB attribution score for negative events (IPSAQ)	USA	41.8 (9.5)	17/32 (53%)
	2. Inpatients with psychosis (as above) with non-persecutory delusions (>50% grandiose delusions; thus, this group was just used for the correlational analysis)	28	Explicit self-esteem score (RSES)		43 (10.9)	9/28 (32%)
	3. Healthy controls	50			22.1 (4.8)	9/50 (18%)
Diez-Alegria, 2006	1. Mostly patients with psychosis (paranoid schizophrenia, schizoaffective disorder or brief psychotic disorder) with PDs	40	External-personal attribution score for negative events (IPSAQ)	Spain	33.3 (8.4)	27/40 (68%)
	2. Mostly inpatients and outpatients with psychosis (paranoid schizophrenia or schizoaffective disorder) with remitted PDs	25			31.1 (4.9)	21/25 (84%)
	3. Inpatients and outpatients with depression (major depressive disorder or dysthymia)	35			39.6 (12.2)	9/35 (26%)
	4. Healthy controls	36			30.4 (7.4)	21/36 (58%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Erickson, 2012	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder)	57	Explicit self-esteem score (mean of RSES across time points) Self-esteem instability score (SD of RSES across time points) Paranoia score (mean of PANSS P6 across time points)	USA	47.26 (8.31)	48/57 (84%)
Espinosa, 2014	1. Inpatients with psychosis (schizophrenia spectrum disorder) with PDs	79	Negative explicit self-esteem score (EBS 'self-self' subscale)	Spain	34.9 (12)	46/79 (58%)
	2. Mostly outpatients with depression (depressive disorder)	38	Negative implicit self-esteem score (GNAT self index)		43.5 (11.4)	9/38 (24%)
	3. Healthy controls	52			37.4 (1.1)	30/52 (58%)
Fear, 1996	1. Patients with psychosis (delusional disorder) with PDs	20	Internality attribution score for negative events (ASQ)	UK	Not reported	Not reported
	2. Patients with psychosis (delusional disorder) with non-persecutory delusions (>50% grandiose delusions; thus, this group was just used for the correlational analysis)	9			Not reported	Not reported
	3. Healthy controls	20			Not reported	Not reported

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Fornells-Ambrojo, 2009	1. Patients with early psychosis (schizophrenia, schizophreniform or schizoaffective disorder) with 'poor me' PDs	20	External-personal attribution score for negative events (ARAT)	UK	27.2 (7.9)	18/20 (90%)
	2. Patients with depression (unipolar depression)	21	Explicit self-esteem score (RSES)		42.6 (9.5)	9/21 (43%)
	3. Healthy controls	32			26.7 (5.3)	26/32 (81%)
Freeman, 1998	1. Patients with psychosis (schizophrenia or delusional disorder) with PDs	28	Explicit self-esteem score (SCQ)	UK	39.1 (10.4)	18/28 (64%)
	2. Patients with psychosis (schizophrenia, delusional disorder or schizoaffective disorder) of whom most had non-persecutory delusions (reference to grandiose delusions; thus, this group was just used for the correlational analysis)	25			40 (12.7)	15/25 (60%)
Freeman, 2012	1. Patients with psychosis (schizophrenia spectrum disorder) of whom most had PDs	130	Negative explicit self-esteem score (BCSS 'negative self' subscale)	UK	41.1 (11.6)	82/130 (63.08%)
			Paranoia score (using visual analog scales)			

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Garety, 2013	1. Patients with psychosis (schizophrenia, schizoaffective disorder or delusional disorder) with PDs alone	118	Explicit self-esteem score (RSES)	UK	37.68 (11.05)	80/118 (67.8%)
	2. Patients with psychosis (as above) with persecutory and grandiose delusions	52			38.48 (11.97)	43/52 (83%)
	3. Patients with psychosis (as above) with neither persecutory or grandiose delusions	43			34.92 (9.76)	27/43 (63%)
Humphreys, 2006	1. Patients with recent onset psychosis (schizophrenia, schizophreniform or schizoaffective disorder) with PDs	15	EB attribution score (IPSAQ) Explicit self-esteem score (RSES)	UK	Entire sample: 27.91 (7.81)	Entire sample: 28/35 (80%)
	2. Patients with recent onset psychosis (as above) without PDs	20	Negative explicit self-esteem score (SESS-sv NES dimension) Paranoia score (PANSS P6)			
Janssen, 2006	1. Inpatients and outpatients with psychosis (schizophrenia, schizoaffective disorder or unspecified functional psychosis)	23	EB attribution score (IPSAQ) Paranoia score (PSE item)	Netherlands	31.8 (9.3)	17/23 (74%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Jolley, 2006	1. Patients with psychosis (schizophrenia, schizoaffective psychosis or delusional disorder) with PDs alone	7	Internality attribution score for negative events (ASQ)	UK	Entire sample: 37.1 (9.3)	Entire sample: 50/71 (70%)
	2. Patients with psychosis (as above) with persecutory and grandiose delusions	7				
	3. Patients with psychosis (as above) without PDs	34				
Jones, 2010	1. Patients with psychosis (schizophrenia)	87	Explicit self-esteem score (RSES) Paranoia score (CPRS 'ideas of persecution' item)	UK	39 (10.5)	50/87 (57%)
Kesting, 2011	1. Inpatients and outpatients with psychosis (schizophrenia) with PDs	28	Explicit self-esteem score (RSES)	Germany	34.64 (11.26)	18/28 (64%)
	2. Inpatients and outpatients with psychosis (schizophrenia) with remitted PDs	31	Implicit self-esteem score (IAT D-measure)		32 (9.7)	20/31 (65%)
	3. Inpatients with depression (depressive disorder)	21			46.75 (8.12)	7/21 (33%)
	4. Healthy controls	59			35.15 (1163)	39/59 (66%)
Kinderman, 1994	1. Inpatients and outpatients with psychosis (schizophrenia or delusional disorder) with PDs	16	Negative explicit self-esteem score (endorsement of negative adjectives from the whole PPQ)	UK	34.3 (12.5)	12/16 (75%)
	2. Inpatients and outpatients with depression	16	Negative implicit self-esteem (EST 'negative interference' index)		33.9 (9.2)	11/16 (69%)
	3. Healthy controls	16			31.3 (11)	11/16 (69%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Kinderman, 1997	1. Patients with psychosis (schizophrenia or delusional disorder) with PDs	20	External-personal attribution score for negative events (IPSAQ)	UK	Not reported	13/20 (65%)
	2. Patients with depression (major depressive episode)	20			Not reported	15/20 (75%)
	3. Healthy controls	20			Not reported	15/20 (75%)
Kinderman, 2003	1. Inpatients and outpatients with PDs of whom most had psychosis (schizophrenia and paranoid psychosis)	13	Explicit self-esteem score (SCC 'self-actual' index)	UK	Not reported	8/13 (62%)
	2. Inpatients with depression	11			Not reported	6/11 (55%)
	3. Healthy controls	13			Not reported	4/13 (31%)
Langdon, 2006	1. Outpatients with psychosis (schizophrenia) with PDs	19	PB attribution score for negative events (self ratings) (IPSAQ)	Australia	35.2 (11.2)	Entire sample of psychosis patients: 22/34 (65%)
	2. Outpatients with psychosis (schizophrenia) without PDs	15			37.7 (9.7)	
	3. Healthy controls	21			39.3 (11.7)	Not reported
Langdon, 2010	1. Outpatients with psychosis (schizophrenia) of whom most have current PDs	35	PB attribution score for negative events (IPSAQ) Paranoia score (PS)	Australia	35.9 (10.4)	23/35 (66%)
	2. Healthy controls	34			32 (12.9)	26/34 (76%)
Langdon, 2013	1. Patients with early psychosis (mostly paranoid schizophrenia) of whom most had current PDs	23	External-personal attribution score for negative events (IPSAQ)	Australia	20.91 (1.83)	22/23 (96%)
	2. Healthy controls	19	Paranoia score (BPRS suspiciousness item)		20.79 (1.81)	17/19 (89%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Lee, 2004	1. Inpatients and outpatients with psychosis (paranoid schizophrenia, schizoaffective disorder or delusional disorder) with PDs	12	External-personal attribution score for negative events (interview transcripts were rated using CAVE and the 'core' attribution dataset was chosen)	UK	46.82 (12.69)	9/12 (75%)
	2. Healthy controls	12			43.17 (13.82)	9/12 (75%)
Lincoln, 2010	1. Inpatients and outpatients with psychosis (schizophrenia, schizoaffective disorder or delusional disorder) with PDs	25	External-personal attribution score for negative events (IPSAQ) Explicit self-esteem score (RSES)	Germany	35.4 (11.8)	14/25 (56%)
	2. Inpatients and outpatients with psychosis (as above) with remitted PDs	25			32.2 (9.7)	15/25 (60%)
	3. Healthy controls with high levels of subclinical paranoia	25			33.4 (11.7)	18/25 (72%)
	4. Healthy controls with low levels of subclinical paranoia	25			37.8 (12)	10/25 (40%)
Lyon, 1994	1. Inpatients and outpatients with psychosis (paranoid schizophrenia or delusional disorder of the paranoid type) with PDs	14	Internality attribution score for negative events (ASQpf) Explicit self-esteem score (RSES)	UK	35.6 (9.89)	12/14 (86%)
	2. Inpatients and outpatients with depression (major depressive episode or depressive disorder)	14			40.9 (9.65)	12/14 (86%)
	3. Healthy controls	14			35.7 (9.66)	12/14 (86%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
MacKinnon, 2011	1. Outpatients with psychosis (mostly schizophrenia) with PDs	16	Explicit self-esteem score (RSES)	UK	41.69 (11.09)	14/16 (88%)
	2. Healthy controls	20	Implicit self-esteem score (IAT D-measure, improved algorithm)		29.5 (11.42)	8/20 (40%)
Martin, 2002	1. Outpatients with psychosis (schizophrenia) with PDs	15	External-personal attribution score for negative events (self ratings) (IPSAQ)	USA	39.1 (8.7)	8/15 (53%)
	2. Outpatients with psychosis (schizophrenia) without PDs	15			34.3 (10.2)	7/15 (47%)
	3. Healthy controls	16			36.8 (9.6)	7/16 47%)
McCulloch, 2006	1. Older patients with late-onset psychosis with delusions (all but one of these patients had delusions that were primarily persecutory)	13	Explicit self-esteem score (RSES)	UK	74.9 (5.26)	4/13 (31%)
	2. Older patients with depression (affective disorder)	15	Negative implicit self-esteem score (EST 'depression interference' index, calculated by subtracting response time to neutral words from response time to depression-related words)		77.6 (6.94)	4/15 (27%)
	3. Age-matched healthy controls	15			75 (7.37)	4/15 (27%)
McKay, 2005	1. Outpatients with psychosis (mostly schizophrenia) with PDs	13	External-personal attribution score for negative events (self ratings) (IPSAQ)	Australia	42.23 (9.78)	7/13 (54%)
	2. Outpatients with psychosis (as above) with remitted PDs	12	Paranoia score (SAPS persecution item)		37.58 (10.98)	3/12 (25%)
	3. Healthy controls	19			35.89 (11.71)	7/19 (37%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
McKay, 2007	1. Outpatients with psychosis (mostly schizophrenia) with PDs	10	Explicit self-esteem score (raw mean) (RSES)	Australia	41.6 (9.49)	7/10 (70%)
	2. Outpatients with psychosis (as above) with remitted PDs	10	Implicit self-esteem score (raw mean) (IAT index)		35.8 (10.8)	2/10 (20%)
	3. Healthy controls	19			35.89 (11.71)	7/19 (37%)
Mehl, 2010	1. Inpatients and outpatients with psychosis (schizophrenia spectrum disorder) with PDs	23	External-personal attribution score for negative events (IPSAQ)	Germany	34.61 (10.81)	12/23 (52%)
	2. Inpatients and outpatients with psychosis (as above) with remitted PDs	18			32.17 (10.68)	11/18 (61%)
	3. Healthy controls	22			33.73 (10.28)	11/22 (50%)
Mehl, 2014	1. Inpatients and outpatients with psychosis (schizophrenia spectrum disorder)	258	External-personal attribution score for negative events (IPSAQ-R)	Germany	37.44 (9.54)	151/258 (58.5%)
	2. Subgroup of these patients with PDs	142	Paranoia score (PANSS P6)		37.75 (9.6)	84/142 (59.15%)
	3. Healthy controls	51			35.77 (9.47)	30/51 (59%)
Melo, 2006	1. Inpatients with psychosis (delusional disorder, schizophrenia or schizoaffective disorder) with ‘poor me’ PDs	26	Internality attribution score for negative events (ASQ)	UK	34.84 (8.93)	17/26 (65%)
	2. Inpatients with psychosis (as above) with ‘bad me’ PDs	18			34 (14.35)	16/18 (89%)
	3. Healthy controls	21			40.1 (14.2)	16/21 (76%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Melo, 2013	1. Inpatients with psychosis (delusional disorder, schizophrenia or schizoaffective disorder) with 'poor me' PDs	32	Internality attribution score for the most negative event (SDEI) Explicit self-esteem score (RSES)	UK	38.78 (10.06)	23/32 (72%)
	2. Inpatients with psychosis (as above) with 'bad me' PDs	12			33.58 (8.46)	8/12 (67%)
	3. Healthy controls	25			36.52 (11.21)	20/25 (80%)
Menon, 2013	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder) with delusions of reference of whom 50% had mixed referential and persecutory delusions	18	PB attribution score for negative events (IPSAQ)	Canada	39.6 (12.4)	11/18 (61%)
	2. Healthy controls	17			35.7 (6.8)	10/17 (59%)
Merrin, 2007	1. Inpatients and outpatients with psychosis (mostly schizophrenia or schizoaffective disorder) with PDs	24	External-personal attribution score for negative events (modified inductive reasoning task using items from IPSAQ)	UK	38.21 (11.21)	17/24 (71%)
	2. Inpatients and outpatients with depression (major depressive disorder)	24			44.79 (11.12)	17/24 (71%)
	3. Healthy controls	24			38.13 (10.61)	14/24 (58%)
Mizrahi, 2008	1. Inpatients and outpatients with psychosis (schizophrenia, schizophreniform or schizoaffective disorder)	86	PB attribution score for negative events (IPSAQ) Paranoia score (PANSS P6)	Canada	31.9 (11.5)	71/86 (83%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Moritz, 2006	1. Inpatients with psychosis (schizophrenia) with PDs	13	Explicit self-esteem score (RSES)	Germany	34.15 (12.29)	7/13 (54%)
	2. Inpatients with psychosis (schizophrenia) without PDs	10	Implicit self-esteem score (IAT D-measure)		34.1 (8.8)	6/10 (60%)
	3. Inpatients with depression (major depressive disorder)	14			31.71 (11.28)	7/14 (50%)
	4. Healthy controls	41			23.37 (6.93)	13/41 (32%)
Moritz, 2007	1. Inpatients with psychosis (schizophrenia or schizoaffective disorder) of whom more than 50% had current PDs	35	Internality attribution score for negative events (self ratings) (ASQ-B)	Germany	34.23 (9.29)	19/35 (54%)
	2. Inpatients with depression (major depressive disorder)	18			39.83 (8.73)	10/18 (56%)
	3. Healthy controls	28			33.5 (10.23)	10/28 (36%)
Palmier-Claus, 2011	1. Inpatients and outpatients with first-episode psychosis	256	Negative self-esteem instability score (SD of negative scores of RSES across time points) Positive self-esteem instability score (SD of positive scores of RSES across time points) Paranoia score (mean of PANSS P6 across time points)	UK	Not reported	177/256 (69.14%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Randall, 2003	1. Patients with psychosis (schizophrenia or schizoaffective disorder) with PDs	18	External-personal attribution score for negative events (self ratings) (IPSAQ)	UK	34.89 (11.15)	14/18 (78%)
	2. Patients with psychosis (as above) with remitted PDs	14			34.71 (10.28)	8/14 (57%)
	3. Healthy controls	18			31.89 (8.53)	11/18 (61%)
Randjbar, 2011	1. Patients with psychosis (schizophrenia) with PDs	10	Explicit self-esteem score (RSES)	Germany	40 (15.33)	8/10 (80%)
	2. Patients with psychosis (schizophrenia) without PDs	19			39.47 (10.43)	9/19 (47%)
	3. Healthy controls	33			33.97 (11.1)	10/33 (30%)
Ringer, 2014	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder)	88	Explicit self-esteem score (MSEI) Paranoia score (PANSS P6)	USA	46.64 (9.15)	74/88 (84%)
Romm, 2011	1. Patients with first-episode psychosis (mostly schizophrenia spectrum disorder)	113	Explicit self-esteem score (RSES) Paranoia score (PANSS P6)	Norway	25.79 (7.7)	76/113 (67.26%)
Sharp, 1997	1. Outpatients with psychosis (delusional disorder) with persecutory (N = 14) or grandiose delusions (N = 5)	19	Internality attribution score for negative events (ASQ)	UK	52.89 (14.33)	8/19 (42%)
	2. Outpatients with psychosis (delusional disorder) with non-persecutory or non-grandiose delusions	12			44 (16.46)	7/12 (58%)
	3. Healthy controls	24			42.88 (13.12)	10/24 (42%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Smith, 2005	1. Inpatients and outpatients with psychosis (mostly schizophrenia or schizoaffective disorder) with grandiose delusions of which more than half have current PDs	20	Explicit self-esteem score (RSCQ) Negative implicit self-esteem score (EST 'depression interference' index)	UK	37.1 (10.1)	14/20 (70%)
	2. Healthy controls	21			33.1 (10.8)	12/21 (57%)
Sundag, 2015	1. Inpatients with psychosis (schizophrenia, delusional or schizoaffective disorder) with PDs	33	Explicit self-esteem score (RSES)	Germany	35.8 (11)	19/33 (58%)
	2. Inpatients with psychosis (as above) with remitted PDs	10			31.3 (8.4)	6/10 (60%)
	3. Healthy controls	33			34.5 (15.6)	15/33 (45%)
Thewissen, 2008	1. Patients with psychosis (schizophrenia or schizoaffective disorder) with PDs	30	Explicit self-esteem score (mean of the ESM momentary self-esteem reports for each person)	Netherlands	38.1 (10.7)	26/30 (87%)
	2. Patients with psychosis (as above) with other positive symptoms	34	Self-esteem instability score (SD of ESM momentary self-esteem reports for each person)		36 (11.6)	26/34 (76%)
	3. Patients with psychosis (as above) with remitted psychotic symptoms	15			32.5 (12.3)	14/15 (93%)
	4. High schizotypy non-psychiatric controls	38	Paranoia score (PS)		47.3 (10.3)	13/38 (34%)
	5. Healthy controls	37			48.7 (9.2)	14/37 (38%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Udachina, 2012	1. Inpatients and outpatients with psychosis (schizophrenia, schizoaffective or delusional disorder) with 'poor me' PDs	14	Explicit self-esteem score (ESM self-esteem) Self-esteem instability score (mean moment-to-moment change in ESM self-esteem reports for each person)	UK	39.36 (15.37)	7/14 (50%)
	2. Inpatients and outpatients with psychosis (as above) with 'bad me' PDs	15			39.93 (11.84)	9/15 (60%)
	3. Inpatients and outpatients with psychosis (as above) with remitted PDs	12			41.67 (12.2)	8/12 (67%)
	4. Healthy controls	23			37.78 (15.21)	13/23 (57%)
Valiente, 2011	1. Inpatients with psychosis (mostly schizophrenia spectrum disorder) with PDs	35	Explicit self-esteem score (E-SEI) Implicit self-esteem score (GNAT index)	Spain	34.9 (12)	19/35 (55%)
	2. Mostly outpatients with depression (depressive disorder)	35			43.5 (11.4)	8/35 (23%)
	3. Healthy controls	44			37.4 (13.1)	20/44 (46%)
Vass, 2015	1. Patients with psychosis (schizophrenia spectrum disorder)	80	Explicit self-esteem (SERS) Paranoia score (PANSS P6)	UK	39.15 (11.56)	49/80 (61%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Vazquez, 2008	1. Patients with psychosis (mostly schizophrenia spectrum disorder) with PDs	40	Explicit self-esteem score (RSES) Implicit self-esteem score (indicated by the recall of positive versus negative words on the SRIRT)	Spain	33.3 (8.4)	27/40 (68%)
	2. Inpatients and outpatients with psychosis (as above) with remitted PDs	25			31.1 (4.9)	21/25 (84%)
	3. Inpatients and outpatients with depression (major depressive disorder or dysthymia)	35			39.6 (12.2)	9/35 (26%)
	4. Healthy controls	36			30.4 (7.4)	21/36 (58%)
Vorontsova, 2013	1. Outpatients with psychosis (schizophrenia, schizoaffective disorder or delusional disorder) with PDs and no comorbid depression	30	Negative explicit self-esteem score (BCSS 'negative self' subscale)	UK	40.1 (10.7)	19/30 (63%)
	2. Outpatients with depression (major depressive episode) and no PDs	30			42.5 (13.1)	14/30 (47%)
	3. Healthy controls	30			40.4 (13.1)	13/30 (43%)
Warman, 2011	1. Outpatients with psychosis (schizophrenia or schizoaffective disorder)	30	Explicit self-esteem score (MSEI) Paranoia score (PANSS P6)	USA	48.93 (5.11)	30/30 (100%)
Wickham, 2015	1. Inpatients and outpatients with psychosis (mostly schizophrenia spectrum disorder)	176	Negative explicit self-esteem (SERS negative subscale) Paranoia score (PANSS P6)	UK	Not reported	123/176 (69.87%)

Study Ref (First Author, Year)	Group/s Included in Review	N Participants	Variable/s Used in Analysis	Country	Age, Mean (SD)	N (%) Male
Wittorf, 2012	1. Inpatients and outpatients with psychosis (paranoid schizophrenia) with PDs	20	PB attribution score for negative events (IPSAQ-R)	Germany	35.3 (9)	13/20 (65%)
	2. Inpatients and outpatients with depression (major depressive episode)	20	Paranoia score (PANSS P6)		36.3 (9.7)	8/20 (40%)
	3. Healthy controls	55			31.7 (10.6)	21/55 (38%)

Abbreviations: ARAT, Attributional style: Achievement and Relationships Attributions Task; ASQ, Attributional Style Questionnaire; ASQ-B, ASQ modified by Brunstein; ASQpf, ASQ parallel form; BCSS, Brief Core Schema Scale; BAI-R, Gudjonsson Blame Attribution Inventory-Revised; BPRS, Brief Psychiatric Rating Scale; CAVE, Content Analysis of Verbatim Explanations; CPRS, Comprehensive Psychopathological Rating Scale; CSEI, Coopersmith Self-Esteem Inventory; DCC, distinctiveness, consistency and consensus. EB, Externalising Bias; EBS, Evaluative Beliefs Scale; E-SEI, Composite of self-worth subscale of World Assumption Scale and Spanish version of self-acceptance subscale of the Scales of Psychological Wellbeing; ESM, Experience Sampling Method; EST, Emotional Stroop Task; FPS, Feningstein Paranoia Scale; GNAT, Go/No-go Association Task; IAT, Implicit Association Task; IPSAQ, Internal, Personal, and Situational Attributions Questionnaire; IPSAQ-R, IPSAQ-Revised; LACS, Leeds Attributional Coding System; MMPI, Minnesota Multiphasic Personality Inventory; MSEI, Multidimensional Self-Esteem Inventory; PANSS P6, Positive and Negative Syndrome Scales 'suspiciousness/persecution' item; PB, Personalizing bias; PDs, persecutory delusions; PPQ, Personal Profile Questionnaire; PS, Paranoia Scale; PSE, Present State Examination; RSCQ, Robson Self-Concept Questionnaire; RSES, Rosenberg Self-Esteem Scale; SAPS, Scale for the Assessment of Positive Symptoms; SAQ, Social Attributions Questionnaire; SCC, Self-Concept Checklist; SCQ, Self-Concept Questionnaire; SDEI, Significant Daily Events Interview; SESS-sv NES, Self-Evaluation and Social Support interview-schizophrenia version Negative Evaluation of Self (dimension); SERS, Self-Esteem Rating Scale; SERS-SF, SERS-Short Form; SRIRT, Self-Referent Incidental Recall Task.

I. Data Used for Each Meta-Analysis

Table I.1. Difference in Externalising Attributional Bias: Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

	Psychosis With PDs			Healthy Controls			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Aakre, 2009	18	33.98	16.44	29	21.82	12.32	47
Bentall, 1991	17	4.65	1.97	17	2.47	2.43	34
Bentall, 2005	16	-35.37	8.38	16	-50	4.64	32
Berry, 2015	22	4.05	2.13	25	2.36	2.16	47
Combs, 2009	32	0.75	0.19	50	0.55	0.24	82
Diez-Alegria, 2006	40	7.35	3.65	36	4.75	2.58	76
Fear, 1996	20	-20.5	6	20	-24.6	2.9	40
Fornells-Ambrojo, 2009	20	2.45	1	32	1.71	1.07	52
Kinderman, 1997	20	7.55	2.93	20	4.25	2.73	40
Langdon, 2006	19	0.64	0.23	21	0.67	0.24	40
Langdon, 2010	35	70	30	34	57	26	69
Langdon, 2013	23	28.33	8.01	19	29.17	7.28	42
Lee, 2004	12	3.33	2.23	12	1.33	1.23	24
Lincoln, 2010	25	6.56	5.62	50	3.62	3.1	75
Lyon, 1994	14	-15.07	4.48	14	-23	8.97	28
Martin, 2002	15	6.7	2.9	16	6.5	4.2	31
McKay, 2005	13	6.08	1.8	19	6.58	3.4	32
Mehl, 2010	20	4.89	3.97	21	3.33	3.18	41
Mehl, 2014	142	37.65	14.18	51	43.68	15.63	193
Melo, 2006	35	-19.28	8.56	20	-23.65	6.1	55
Melo, 2013	40	-3.73	2.39	25	-2.92	2.33	65
Menon, 2013	18	0.63	0.37	17	0.68	0.26	35
Merrin, 2007	24	1.71	1.37	24	1.63	0.65	48

	Psychosis With PDs			Healthy Controls			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Moritz, 2007	35	-3.89	0.68	28	-3.49	0.8	63
Randall, 2003	18	5.28	3.43	18	5.33	2.74	36
Sharp, 1997	19	-16.21	3.9	24	-24.41	2.6	43
Wittorf, 2012	20	0.58	0.2	52	0.62	0.18	72

Table I.2. Difference in Externalising Attributional Bias: Psychosis With Persecutory Delusions (PDs) vs Depression

	Psychosis With PDs			Depression			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Bentall, 1991	17	4.65	1.97	17	3	2	34
Bentall, 2005	16	-35.37	8.38	16	-65.75	6.1	32
Candido, 1990	15	-3.95	1.12	15	-5.91	0.57	30
Diez-Alegria, 2006	40	7.35	3.65	35	5.22	2.34	75
Fornells-Ambrojo, 2009	20	2.45	1	21	1.76	1.26	41
Kinderman, 1997	20	7.55	2.93	20	2.45	2.42	40
Lyon, 1994	14	-15.07	4.48	14	-23.33	6.66	28
Merrin, 2007	24	1.71	1.37	24	1.58	1.18	48
Moritz, 2007	35	-3.89	0.68	18	-4.22	1.14	53
Wittorf, 2012	20	0.58	0.2	20	0.65	0.20	40

Table I.3. Difference in Externalising Attributional Bias: Psychosis with Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

	Psychosis With PDs			Psychosis Without PDs			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Aakre, 2009	18	33.98	16.44	47	23.65	14.96	65
Carlin, 2005	31	6.13	4.05	34	6.14	3.57	65
Diez-Alegria, 2006	40	7.35	3.65	25	5.12	3.27	65
Jolley, 2006	14	-3.85	1.00	34	-4.8	1.3	48
Langdon, 2006	19	0.64	0.23	15	0.68	0.27	34
Lincoln, 2010	25	6.56	5.62	25	4.08	3.82	50
Martin, 2002	15	6.7	2.9	15	6.5	3.1	30
McKay, 2005	13	6.08	1.8	11	6.45	3.24	24
Mehl, 2010	20	4.89	3.97	16	3.06	3.02	36
Randall, 2003	18	5.28	3.43	14	5.21	3.81	32
Sharp, 1997	19	-16.21	3.9	12	-26.08	7.4	31

Table I.4. Correlation between Externalising Attributional Bias and Paranoia Severity in People With Psychosis

Study Ref (First Author, Year)	Total N	R
Aakre, 2009	65	0.29
Candido, 1990	45	0.51
Carlin, 2005	65	0
Combs, 2009	60	0.37
Diez-Alegria, 2006	65	0.3
Fear, 1996	29	-0.01
Humphreys, 2006	35	0.11
Janssen, 2006	23	0.39
Jolley, 2006	48	0.33
Langdon, 2006	34	-0.08
Langdon, 2010	69	0.27
Langdon, 2013	23	-0.19
Lincoln, 2010	50	0.25
Martin, 2002	30	0.03
McKay, 2005	24	-0.08
Mehl, 2010	36	0.25
Mehl, 2014	258	0.1
Mizrahi, 2008	86	-0.17
Randall, 2003	32	0.01
Sharp, 1997	31	0.66
Wittorf, 2012	20	0.01

Table I.5. Difference in Explicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

	Psychosis With PDs			Healthy Controls			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Bentall, 2008	39	-72.53	25.78	33	-45.88	10.72	72
Collett, 2016	21	11.95	5.63	21	21.1	4.49	42
Combs, 2009	32	30.9	4.4	50	35	4.5	82
Espinosa, 2014	79	-2.51	3.46	52	-0.17	0.73	131
Fornells-Ambrojo, 2009	20	30.15	5.06	32	30.72	4.39	52
Kesting, 2011	28	18.93	5.21	59	25.12	3.53	87
Kinderman, 1994	16	-70.44	18.19	16	-50.81	14.67	32
Kinderman, 2003	13	25.77	28.64	13	41.54	12.53	26
Lincoln, 2010	25	18.4	7	50	24.05	4.23	75
Lyon, 1994	14	12.54	5.39	14	11.21	4.26	28
MacKinnon, 2011	16	16.31	5.97	20	23.05	4.38	36
McCulloch, 2006	13	-17.85	4.95	15	-17.8	4.43	28
McKay, 2007	9	-0.8	1.24	19	0.15	0.87	28
Melo, 2013	41	26.17	6.35	25	31.12	4.3	66
Moritz, 2006	13	17.58	5.16	41	22.65	4.14	54
Randjbar, 2011	10	15.7	5.1	33	22.72	5.71	43
Smith, 2005	20	136.3	28.1	21	132.7	26.9	41
Sundag, 2015	33	32.5	8.6	33	42.6	4.1	66
Udachina, 2012	29	4.67	1.5	23	6.21	0.69	52
Valiente, 2011	35	0.17	0.94	44	0.31	0.71	79
Vazquez, 2008	40	31.5	4.8	36	35.6	3.9	76
Vorontsova, 2013	30	-4.83	3.57	30	-1.67	1.49	60

Table I.6. Difference in Explicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Depression

	Psychosis With PDs			Depression			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Bentall, 2008	39	-72.53	25.78	27	-81.81	21.28	66
Candido, 1990	15	77.33	11.97	15	27.2	16.37	30
Espinosa, 2014	79	-2.51	3.46	38	-3.56	3.57	117
Fornells-Ambrojo, 2009	20	30.15	5.06	21	21.29	4.46	41
Kesting, 2011	28	18.93	5.21	21	17.57	6.47	49
Kinderman, 1994	16	-70.44	18.19	16	-67.88	15.95	32
Kinderman, 2003	13	25.77	28.64	11	24.09	19.39	24
Lyon, 1994	14	12.54	5.39	14	5.57	3.06	28
McCulloch, 2006	13	-17.85	4.95	15	-26.33	5.92	28
Moritz, 2006	13	17.58	5.16	14	14.86	5.97	27
Valiente, 2011	35	0.17	0.94	35	-0.63	0.67	70
Vazquez, 2008	40	31.5	4.8	35	24.5	6.02	75
Vorontsova, 2013	30	-4.83	3.57	30	-8.37	4.57	60

Table I.7. Difference in Explicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

	Psychosis With PDs			Psychosis Without PDs			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Bentall, 2008	39	-72.53	25.78	29	-65.3	22.46	68
Garety, 2013	170	-24.47	6.15	43	-23.72	6.4	213
Humphreys, 2006	15	-1.07	1	20	0	1	35
Kesting, 2011	28	18.93	5.21	31	18.29	5.98	59
Lincoln, 2010	25	18.4	7	25	20	6.08	50
McKay, 2007	9	-0.8	1.24	9	0.47	0.51	18
Moritz, 2006	13	17.58	5.16	10	12.56	5.85	23
Randjbar, 2011	10	15.7	5.1	19	17.56	7.77	29
Sundag, 2015	33	32.5	8.6	10	37.3	8.1	43
Udachina, 2012	29	4.67	1.5	12	5.79	0.98	41
Vazquez, 2008	40	31.5	4.8	25	30.5	4.7	65

Table I.8. Correlation between Explicit Self-Esteem and Paranoia Severity in People With Psychosis

Study Ref (First Author, Year)	Total N	r
Bentall, 2008	68	-0.43
Ben-Zeev, 2009	194	-0.5
Combs, 2009	60	-0.17
Erickson, 2012	57	-0.57
Freeman, 1998	53	0
Freeman, 2012	130	-0.25
Garety, 2013	213	-0.05
Humphreys, 2006	35	-0.4
Jones, 2010	87	-0.23
Kesting, 2011	59	0.06
Lincoln, 2010	50	-0.12
McKay, 2007	18	-0.55
Moritz, 2006	23	0.41
Randjbar, 2011	29	-0.13
Ringer, 2014	88	-0.23
Romm, 2011	113	-0.3
Sundag, 2015	43	-0.23
Thewissen, 2008	154	-0.32
Udachina, 2012	41	-0.35
Vass, 2015	80	-0.35
Vazquez, 2008	65	0.1
Warman, 2011	30	-0.37
Wickham, 2015	176	-0.51

Table I.9. Difference in Implicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

	Psychosis With PDs			Healthy Controls			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Espinosa, 2014	79	9.88	95.48	52	42.57	49.9	131
Kesting, 2011	28	0.5	0.33	59	0.6	0.4	87
Kinderman, 1994	16	-7.69	8.5	16	0.19	8.5	32
MacKinnon, 2011	16	0.93	1.01	20	0.48	0.45	36
McCulloch, 2006	13	-2.86	0.79	15	-2.86	0.71	28
McKay, 2007	10	-0.75	0.78	19	0.15	0.99	29
Moritz, 2006	13	-0.03	0.72	41	0.84	0.67	54
Smith, 2005	20	-12	95	21	-32	49	41
Valiente, 2011	35	-3.25	81.35	44	40.48	57.6	79
Vazquez, 2008	40	0.65	2.17	36	2.08	2.09	76

Table I.10. Difference in Implicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Depression

	Psychosis With PDs			Depression			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Espinosa, 2014	79	9.88	95.48	38	18.47	72.8	117
Kesting, 2011	28	0.5	0.33	21	0.64	0.29	49
Kinderman, 1994	16	-7.69	8.5	16	-4.63	5.25	32
McCulloch, 2006	13	-2.86	0.79	15	-3.57	0.8	28
Moritz, 2006	13	-0.03	0.72	14	0.61	0.67	27
Valiente, 2011	35	-3.25	81.35	35	18.46	75.65	70
Vazquez, 2008	40	0.65	2.17	35	0.05	2.01	75

Table I.11. Difference in Implicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

	Psychosis With PDs			Psychosis Without PDs			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Kesting, 2011	28	0.5	0.33	31	0.45	0.44	59
McKay, 2007	10	-0.75	0.78	10	0.47	0.85	20
Moritz, 2006	13	-0.03	0.72	10	0.1	0.84	23
Vazquez, 2008	40	0.65	2.17	25	0.64	1.83	65

Table I.12. Correlation between Implicit Self-Esteem and Paranoia Severity in People With Psychosis

Study Ref (First Author, Year)	Total N	R
Kesting (2011)	59	0.06
McKay (2007)	20	-0.6
Moritz (2006)	23	-0.08
Vazquez (2008)	65	0

Table I.13. Difference in Discrepancy Scores:[a] Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

	Psychosis With PDs			Healthy Controls			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Espinosa, 2014	79	0.34	10.93	52	-1.12	16.48	131
Kesting, 2011	28	-0.24	1.21	59	0.55	1.17	87
Kinderman, 1994	16	-53.11	24.07	16	-51.24	22.06	32
MacKinnon, 2011	16	8.94	9.91	20	19.25	4.73	36
McCulloch, 2006	13	4.75	7.28	15	4.8	6.53	28
McKay, 2007	9	-0.05	1.41	19	0.01	1.3	29
Moritz, 2006	13	17.83	5.85	41	15.73	5.2	54
Smith, 2005	20	-71.24	22.59	21	-70.73	17.12	41
Valiente, 2011	35	0.21	1.38	44	-0.17	1.01	79
Vazquez, 2008	40	29.6	7.27	36	29.52	6.66	76

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Table I.14. Difference in Discrepancy Scores:[a] Psychosis With Persecutory Delusions (PDs) vs Depression

	Psychosis With PDs			Depression			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Espinosa, 2014	79	0.34	10.93	38	-1.71	8.39	117
Kesting, 2011	28	-0.24	1.21	21	-0.84	1.12	49
Kinderman, 1994	16	-53.11	24.07	16	-57.45	18.17	32
McCulloch, 2006	13	4.75	7.28	15	1.88	7.89	28
Moritz, 2006	13	17.83	5.85	14	9.84	6.04	27
Valiente, 2011	35	0.21	1.38	35	-0.85	1.15	70
Vazquez, 2008	40	29.6	7.27	35	24.35	7.66	75

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Table I.15. Difference in Discrepancy Scores: Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions)

	Psychosis With PDs			Psychosis Without PDs			
Study Ref (First Author, Year)	**N1**	**Mean**	**SD**	**N2**	**Mean**	**SD**	**Total N**
Kesting, 2011	28	-0.24	1.21	31	-0.23	1.47	59
McKay, 2007	9	-0.05	1.41	9	0.09	0.99	18
Moritz, 2006	13	17.83	5.85	10	11.74	6.76	23
Vazquez, 2008	40	29.6	7.27	25	28.63	6.51	65

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Table I.16. Correlation between Paranoia Severity and Discrepancy Scores[a] in People With Psychosis

Study Ref (First Author, Year)	Total N	R
Kesting, 2011	59	0
McKay, 2007	18	-0.06
Moritz, 2006	23	0.43
Vazquez, 2008	65	0.07

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Table I.17. Correlation between Paranoia Severity and Self-Esteem Instability in People With Psychosis

Study Ref (First Author, Year)	Total N	r
Erickson, 2012	57	0.21
Palmier-Claus, 2011	256	0.14[a]
Thewissen, 2008	154	0.35
Udachina, 2012	41	0.19

[a]r represents the mean of (a) the correlation between PD severity and negative self-esteem instability and (b) the correlation between PD severity and positive self-esteem instability.

J. Study Quality Assessment Tool

We adapted a tool for assessing the methodological quality of observational studies that has been successfully employed in prior research undertaken by the Agency for Healthcare Research and Quality (AHRQ; Williams et al., 2010). The main methodological quality criteria were retained but the underlying factors related to each study quality criterion were adapted in some instances for this specific context. Each study is assessed on a number of methodological quality criteria (for example, unbiased selection of groups, sample-size calculations, and so on) that are rated as being met, not met, partially met, or being unclear.

Following the guidance of experts in the field of meta-analysis, we will avoid scale-based or aggregated study quality rating. Quality assessments were presented descriptively to guide the interpretation of findings, rather than used as a means to weight or adjust aggregated effect sizes. However, as noted, we planned to test whether specific aspects of methodology were moderators of effect sizes. These included blinding and the matching of participants on demographics.

The tool we used is reproduced below.

General instructions: Grade each criterion as 'Yes', 'No', 'Partially', or 'Can't tell'. Factors to consider when making an assessment are listed under each criterion. Where appropriate (particularly when assigning a 'No', 'Partially', or 'Can't tell' score), please provide a brief rationale for your decision (in parentheses) in the evidence table.

1. Unbiased selection of the cohort?

Factors that help reduce selection bias:

○ Inclusion/exclusion criteria:

○ Recruitment strategy:

- Clearly described
- Relatively free from bias (selection bias might be introduced, for example, by recruitment via advertisement).

2. Selection minimizes baseline differences in prognostic factors?

Factors to consider:

○ Was selection of the comparison group appropriate?

○ Is the comparison group matched with the clinical group on key demographics [age, gender, education (or IQ or a measure of intelligence if education is not reported), ethnicity]?

No = a standardised mean difference (d) of ≥ 0.3 on at least 2; Partial = d of ≥ 0.3 on 1; Yes = d of < 0.3 on 4 or 3 excluding ethnicity

3. Sample size calculated?

Factors to consider:

○ Did the authors report conducting a power analysis or describe some other basis for determining the adequacy of study group sizes for the primary outcome(s) of interest to us?

○ Where a power calculation is presented, do the final numbers obtained match up to this (for example, within 10% of required numbers)?

4. Adequate description of the cohort?

Consider whether the cohort is well-characterized in terms of baseline:

○ Age

○ Sex

○ Education

○ Ethnicity

○ Diagnosis/clinical status

No = reported 1 of the above or less; Partial = reported 2 to 4; Yes = reported all 5 or 4 excluding ethnicity

5. Validated method for ascertaining psychotic disorder?

Factors to consider:

○ Was the method used to ascertain exposure clearly described (details should be sufficient to permit replication in new studies)?

○ Was a valid and reliable measure used to ascertain exposure (subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical interview)? Likewise, relying on medical notes is likely to introduce bias due to variation in how assessment is undertaken.

6. Validated method for ascertaining persecutory delusions or measuring paranoia/persecutory ideation?

Factors to consider:

○ Was the method used to ascertain exposure clearly described (details should be sufficient to permit replication in new studies)?

○ Was a valid and reliable measure used to ascertain exposure (subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical interview)? Likewise, relying on medical notes is likely to introduce bias due to variation in how assessment is undertaken.

○ If appropriate, was the measure implemented consistently across all study participants?

7. Validated method for ascertaining depression (if relevant)?

○ Was the method used to ascertain exposure clearly described (details should be sufficient to permit replication in new studies)?

○ Was a valid and reliable measure used to ascertain exposure (subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical interview)? Likewise, relying on medical notes is likely to introduce bias due to variation in how assessment is undertaken.

8. Validated method for ascertaining absence of diagnosis (if relevant)?

○ Was the method used to determine absence of diagnosis clearly described (details should be sufficient to permit replication in new studies)?

○ Was a valid and reliable measure used to ascertain exposure (subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical interview)?

9. Validated method for measuring externalising attributional bias (if relevant)?

Factors to consider:

○ The IPSAQ, the ASQ or a conceptually equivalent variant should be used.

○ Was the measure implemented consistently across all study participants?

○ Did the measure meet minimal criteria for reliability/validity?

Partial = index C or D in the 'data extraction hierarchy' (assuming the factors above); Yes = index A or B in the 'data extraction hierarchy' (assuming the factors above)

10. Validated method for measuring explicit self-esteem (if relevant)?

Factors to consider:

○ The RSES or a conceptually equivalent variant should be used.

○ Was the measure implemented consistently across all study participants?

○ Did the measure meet minimal criteria for reliability/validity?

11. Validated method for measuring implicit self-esteem (if relevant)?

Factors to consider:

○ The IAT, EST, GNAT or a conceptually equivalent variant should be used.

○ Was the measure implemented consistently across all study participants?

○ Did the measure meet minimal criteria for reliability/validity?

12. Validated method for measuring self-esteem instability (if relevant)?

Factors to consider:

○ ESM, the repeated application of a self-esteem measure or a conceptually equivalent longitudinal method should be used.

○ Was the measure implemented consistently across all study participants?

○ Did the measure meet minimal criteria for reliability/validity?

13. Outcome assessment blind to exposure?

Factors to consider:

○ Were the study investigators who assessed outcomes blind to whether participants had persecutory delusions and/or a psychotic disorder (this criterion will not apply in the case of Internet-based or automated designs where a researcher is not present)?

14. Adequate handling of missing data?

Factors to consider:

○ Are the details of missing data clearly reported, including how missing data was handled in the analyses? If not, is there any reason to believe missing data was present (for example, lower N in analysis than initially reported in the participants section).

○ Did missing data from any group exceed 20%?

○ If missing data was present and substantial, were steps taken to minimize bias (for example, sensitivity analysis or imputation).

K. Outcome-Specific Study Quality Tables

Table K.1. Assessment of Study Methodological Quality – Difference in Externalising Attributional Bias: Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Measuring Externalizing Attributional Bias?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Aakre, 2009	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bentall, 1991	Unclear	Yes	No	Yes	Yes	Yes	Partial	Unclear	No	Yes
Bentall, 2005	Yes	Yes	No	Yes	Yes	Yes	Partial	Partial	No	Yes
Berry, 2015	Yes	Partial	No	Yes	Yes	Yes	Unclear	Yes	No	Yes
Combs, 2009	Partial	No	No	Yes	Yes	Yes	Partial	Yes	No	Yes
Diez-Alegria, 2006	Partial	Partial	No	Partial	Partial	Yes	Yes	Yes	No	Yes
Fear, 1996	Unclear	Unclear	No	No	Partial	Partial	Partial	Yes	No	Yes
Fornells-Ambrojo, 2009	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1997	Partial	Unclear	No	Partial	Partial	Yes	Partial	Yes	No	Yes
Langdon, 2006	Yes	No	No	Partial	Yes	Yes	Yes	Yes	No[b]	Yes
Langdon, 2010	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Langdon, 2013	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Measuring Externalizing Attributional Bias?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Lee, 2004	Yes	Partial	No	Partial	Yes	Yes	Partial	Yes	No	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Partial	Yes	No	Yes
Lyon, 1994	Partial	Yes	No	Yes	Yes	Yes	Partial	Partial	No	Yes
Martin, 2002	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No[b]	Yes
McKay, 2005	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No[b]	Yes
Mehl, 2010	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Unclear
Mehl, 2014	Yes	Yes	No	Yes	Yes	Yes	Yes	Partial	No	Yes
Melo, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Partial	No	Yes
Melo, 2013	Yes	Yes	No	Yes	Yes	Yes	Yes	Unclear	No	Yes
Menon, 2013	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Merrin, 2007	Partial	Partial	No	Yes	Yes	Yes	Yes	Partial	Yes	Yes
Moritz, 2007	Yes	Partial	No	Yes	Yes	Yes	Yes	Partial	No[b]	Yes
Randall, 2003	Unclear	No	No	Yes	Partial	Yes	Unclear	Yes	No[b]	Yes
Sharp, 1997	Partial	Partial	No	Partial	Yes	Yes	Partial	Partial	No	Yes
Wittorf, 2012	Yes	No	No	Yes	Yes	Yes	Yes	Partial	No	Yes

[a]Group comparison studies only. [b]Independent judges' ratings of the participants' responses on the attributional style measure were blind to clinical status, but these were not applicable (self-ratings were our primary outcome).

Table K.2. Assessment of Study Methodological Quality – Difference in Externalising Attributional Bias: Psychosis With Persecutory Delusions (PDs) vs Depression

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Depression?	Validated Method for Measuring Externalizing Attributional Bias?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Bentall, 1991	Unclear	Partial	No	Yes	Yes	Yes	Yes	Unclear	No	Yes
Bentall, 2005	Yes	No	No	Yes	Yes	Yes	Yes	Partial	No	Yes
Candido, 1990	Yes	No	No	Partial	Partial	Yes	Yes	Partial	No	Yes
Diez-Alegria, 2006	Partial	No	No	Partial	Partial	Yes	Partial	Yes	No	Yes
Fornells-Ambrojo, 2009	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1997	Partial	Unclear	No	Partial	Partial	Yes	Partial	Yes	No	Yes
Lyon, 1994	Partial	Partial	No	Yes	Yes	Yes	Yes	Partial	No	Yes
Merrin, 2007	Partial	Partial	No	Yes	Yes	Yes	Yes	Partial	Yes	Yes
Moritz, 2007	Yes	Partial	No	Yes	Yes	Yes	Yes	Partial	No[b]	Yes
Wittorf, 2012	Yes	Partial	No	Yes	Yes	Yes	Yes	Partial	No	Yes

[a]Group comparison studies only. [b]Independent judges' ratings of the participants' responses on the attributional style measure were blind to clinical status, but these were not applicable (self-ratings were our primary outcome).

Table K.3. Assessment of Study Methodological Quality – Difference in Externalising Attributional Bias: Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Measuring Externalizing Attributional bias?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Aakre, 2009	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes
Carlin, 2005	Partial	Unclear	No	No	Partial	Partial	Partial	No	Yes
Diez-Alegria, 2006	Partial	Partial	No	Partial	Partial	Yes	Yes	No	Yes
Jolley, 2006	Yes	Unclear	No	No	Yes	Yes	Partial	Partial[b]	Yes
Langdon, 2006	Yes	Partial	No	Partial	Yes	Yes	Yes	No[c]	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Martin, 2002	Yes	Partial	No	Yes	Yes	Yes	Yes	No[c]	Yes
McKay, 2005	Yes	No	No	Yes	Yes	Yes	Yes	No[c]	Yes
Mehl, 2010	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Unclear
Randall, 2003	Unclear	No	No	Yes	Partial	Yes	Yes	No[c]	Yes
Sharp, 1997	Partial	No	No	Partial	Yes	Yes	Partial	No	Yes

[a]Group comparison studies only. [b]Raters were blind to treatment allocation, but not clinical status. [c]Independent judges' ratings of the participants' responses on the attributional style measure were blind to clinical status, but these were not applicable (self-ratings were our primary outcome).

Table K.4. Assessment of Study Methodological Quality – Correlation between Externalising Attributional Bias and Paranoia Severity in People With Psychosis

Study Ref(First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Ex-ternalizing Attributional Bias?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Aakre, 2009	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Candido, 1990	Yes	No	Partial	Partial	Yes	Partial	No	Yes
Carlin, 2005	Partial	No	No	Partial	Partial	Partial	No	Yes
Combs, 2009	Partial	No	Yes	Yes	Yes	Yes	No	No
Diez-Alegria, 2006	Partial	No	Partial	Partial	Yes	Yes	No	Yes
Fear, 1996	Unclear	No	No	Partial	Partial	Yes	No	Yes
Humphreys, 2006	Yes	No	Partial	Partial	Yes	Partial	No	Yes
Janssen, 2006	Yes	No	Yes	Yes	Yes	Partial	No	Yes
Jolley, 2006	Yes	No	No	Yes	Yes	Partial	Partial[a]	Yes
Langdon, 2006	Yes	No	Partial	Yes	Yes	Yes	No[b]	Yes
Langdon, 2010	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Langdon, 2013	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Lincoln, 2010	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Martin, 2002	Yes	No	Yes	Yes	Yes	Yes	No[b]	Yes
McKay, 2005	Yes	No	Yes	Yes	Yes	Yes	No[b]	Yes
Mehl, 2010	Yes	No	Yes	Yes	Yes	Yes	No	Unclear
Mehl, 2014	Yes	No	Yes	Yes	Yes	Partial	Partial[a]	Yes
Mizrahi, 2008	Yes	No	Yes	Yes	Yes	Yes	No	Yes

Study Ref(First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Ex-ternalizing Attributional Bias?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Randall, 2003	Unclear	No	Yes	Partial	Yes	Yes	No[b]	Yes
Sharp, 1997	Partial	No	Partial	Yes	Yes	Partial	No	Yes
Wittorf, 2012	Yes	No	Yes	Yes	Yes	Partial	No	Yes

[a]Raters were blind to treatment allocation, but not clinical status. [b]Independent judges' ratings of the participants' responses on the attributional style measure were blind to clinical status, but these were not applicable (self-ratings were our primary outcome).

Table K.5. Assessment of Study Methodological Quality – Difference in Explicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diag-nosis?	Validated Method for Measuring Explicit Self-esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Bentall, 2008	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Collett, 2016	Yes	Partial	Yes	Partial	Partial	Yes	Partial	Yes	No	Yes
Combs, 2009	Partial	No	No	Yes	Yes	Yes	Partial	Yes	No	Yes
Espinosa, 2014	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Fornells-Ambrojo, 2009	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Partial	Unclear	No	Yes
Kinderman, 2003	Yes	Unclear	No	Partial	Unclear	Yes	Partial	Partial	No	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Partial	Yes	No	Yes
Lyon, 1994	Partial	Yes	No	Yes	Yes	Yes	Partial	Yes	No	Yes
MacKinnon, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Melo, 2013	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	No	Partial	Yes	Yes	Partial	Yes	No	Yes
Randjbar, 2011	Partial	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Smith, 2005	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Sundag, 2015	Partial	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diag-nosis?	Validated Method for Measuring Explicit Self-esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Udachina, 2012	Yes	Partial	No	Yes	Partial	Yes	Partial	Yes	No	Yes
Valiente, 2011	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	Yes	No	Yes
Vorontsova, 2013	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes

[a]Group comparison studies only.

Table K.6. Assessment of Study Methodological Quality – Difference in Explicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Depression

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Depression?	Validated Method for Measuring Explicit Self-Esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Bentall, 2008	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Candido, 1990	Yes	No	No	Partial	Yes	Partial	Yes	Yes	No	Yes
Espinosa, 2014	Partial	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Fornells-Ambrojo, 2009	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Yes	Unclear	No	Yes
Kinderman, 2003	Yes	Unclear	No	Partial	Unclear	Yes	Partial	Partial	No	Yes
Lyon, 1994	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Partial	Yes	No	Yes
Valiente, 2011	Partial	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Partial	Yes	Partial	Yes	No	Yes
Vorontsova, 2013	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes

[a]Group comparison studies only.

Table K.7. Assessment of Study Methodological Quality – Difference in Explicit Self-Esteem: Psychosis with Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prog-nostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Measuring Explicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Bentall, 2008	Yes	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Garety, 2013	Yes	Partial	No	Partial	Yes	Yes	Yes	Partial[b]	Yes
Humphreys, 2006	Yes	Unclear	No	Partial	Partial	Yes	Yes	No	Yes
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Lincoln, 2010	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Yes	No	Yes
Randjbar, 2011	Partial	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Sundag, 2015	Partial	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Udachina, 2012	Yes	Partial	No	Yes	Partial	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	No	Yes

[a]Group comparison studies only. [b]Raters were blind to treatment allocation, but not clinical status.

Table K.8. Assessment of Study Methodological Quality – Correlation between Explicit Self-Esteem and Paranoia Severity in People with Psychosis

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Explicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Bentall, 2008	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Ben-Zeev, 2009	Yes	No	No	Partial	Yes	Yes	No	Yes
Combs, 2009	Partial	No	Yes	Yes	Yes	Yes	No	No
Erickson, 2012	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Freeman, 1998	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Freeman, 2012	Yes	No	Partial	Yes	Yes	Yes	No	Yes
Garety, 2013	Yes	No	Partial	Yes	Yes	Yes	Partial[b]	Yes
Humphreys, 2006	Yes	No	Partial	Partial	Yes	Yes	No	Yes
Jones, 2010	Yes	No[a]	Partial	Yes	Yes	Yes	Partial[b]	Yes
Kesting, 2011	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Lincoln, 2010	Yes	No	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	Partial	Yes	Yes	Yes	No	Yes
Randjbar, 2011	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Ringer, 2014	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Romm, 2011	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Sundag, 2015	Partial	No	Yes	Yes	Yes	Yes	No	Yes
Thewissen, 2008	Yes	No	Yes	Yes	Yes	Yes	No	Yes

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Explicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Udachina, 2012	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Vass, 2015	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Yes	Yes	No	Yes
Warman, 2011	Yes	No	Partial	Yes	Yes	Yes	No	Yes
Wickham, 2015	Yes	No	Partial	Yes	Yes	Yes	No	Yes

[a]Explicit self-esteem was a secondary outcome so a power calculation would not be expected. [b]Raters were blind to treatment allocation, but not clinical status.

Table K.9. Assessment of Study Methodological Quality – Difference in Implicit Self-Esteem: Psychosis with Persecutory Delusions (PDs) vs Healthy Controls

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Espinosa, 2014	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Partial	Partial	No	Yes
MacKinnon, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Partial	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	No	Partial	Yes	Yes	Partial	Yes	No	Yes
Smith, 2005	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Valiente, 2011	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	Yes	No	Yes

[a]Group comparison studies only.

Table K.10. Assessment of Study Methodological Quality – Difference in Implicit Self-esteem: Psychosis with Persecutory Delusions (PDs) vs Depression

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prog-nostic Factors?[a]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Depression?	Validated Method for Measuring Implicit self-esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Espinosa, 2014	Partial	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Yes	Partial	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Partial	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Partial	Yes	No	Yes
Valiente, 2011	Partial	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Partial	Yes	Partial	Yes	No	Yes

[a]Group comparison studies only.

Table K.11. Assessment of Study Methodological Quality – Difference in Implicit Self-Esteem: Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[a]	Sample Size Cal-culation?	Adequate Description of the Cohort?	Validated Method for As-certaining Psychotic Disorder?	Validated Method for As-certaining PDs?	Validated Method for measuring implicit self-esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	No	Yes

[a]Group comparison studies only.

Table K.12. Assessment of Study Methodological Quality – Correlation between Paranoia Severity and Implicit Self-Esteem in People With Psychosis

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Kesting, 2011	Yes	No	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	Partial	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Yes	Yes	No	Yes

Table K.13. Assessment of Study Methodological Quality – Difference in Discrepancy Scores:[a] Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

Study Ref(First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[b]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Absence of Diagnosis?	Validated Method for Measuring Explicit Self-Esteem?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Espinosa, 2014	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Partial	Unclear	Partial	No	Yes
MacKinnon, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Partial	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	No	Partial	Yes	Yes	Partial	Yes	Yes	No	Yes
Smith, 2005	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Valiente, 2011	Partial	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	Yes	Yes	No	Yes

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem. [b]Group comparison studies only.

Table K.14. Assessment of Study Methodological Quality – Difference in Discrepancy Scores:[a] Psychosis With Persecutory Delusions (PDs) vs Depression

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[b]	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs?	Validated Method for Ascertaining Depression?	Validated Method for Measuring Explicit Self-Esteem?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assessments Blind to Clinical Status?	Missing Data Low or Adequately Handled?
Espinosa, 2014	Partial	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kesting, 2011	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kinderman, 1994	Partial	Partial	No	Partial	Yes	Yes	Yes	Unclear	Partial	No	Yes
McCulloch, 2006	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Partial	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Partial	Yes	Yes	No	Yes
Valiente, 2011	Partial	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Partial	Yes	Partial	Yes	Yes	No	Yes

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem. [b]Group comparison studies only.

Table K.15. Assessment of Study Methodological Quality – Difference in Discrepancy Scores:[a] Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if specified, Grandiose Delusions; GDs)

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Selection Minimizes Baseline Differences in Prognostic Factors?[b]	Sample Size Cal-culation?	Adequate Description of the Cohort?	Validated Method for As-certaining Psychotic Disorder?	Validated Method for As-certaining PDs?	Validated Method for Measuring Explicit Self-Esteem?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Kesting, 2011	Yes	Partial	No	Yes	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	Partial	No	Partial	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	Partial	No	Partial	Partial	Yes	Yes	Yes	No	Yes

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem. [b]Group comparison studies only.

Table K.16. Assessment of Study Methodological Quality – Correlation between Paranoia Severity and Discrepancy Scores[a] in People With Psychosis

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Explicit Self-Esteem?	Validated Method for Measuring Implicit Self-Esteem?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Kesting, 2011	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
McKay, 2007	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Moritz, 2006	Yes	No	Partial	Yes	Yes	Yes	Yes	No	Yes
Vazquez, 2008	Partial	No	No	Partial	Yes	Yes	Yes	No	Yes

[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Table K.17. Assessment of Study Methodological Quality – Correlation between Paranoia Severity and Self-Esteem Instability in People With Psychosis

Study Ref (First Author, Year)	Unbiased Selection of Cohort?	Sample Size Calculation?	Adequate Description of the Cohort?	Validated Method for Ascertaining Psychotic Disorder?	Validated Method for Ascertaining PDs or Measuring Paranoia/Persecutory Ideation?	Validated Method for Measuring Self-Esteem Instability?	Outcome Assess-ments Blind to Clinical Status?	Missing Data Low or Ad-equately Handled?
Erickson, 2012	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Palmier-Claus, 2011	Yes	No	Yes	Yes	Yes	Yes	Partial[a]	Yes
Thewissen, 2008	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Udachina, 2012	Yes	No	Yes	Yes	Yes	Yes	No	Yes

[a]Raters were blind to treatment allocation, but not clinical status.

L. GRADE Assessment Criteria

All assessments were conducted by PM and checked by PH. We applied the following criteria for downgrading to each outcome.

Study Limitations

Individual studies were rated for risk of bias/methodological quality using an adapted version of the Agency for Healthcare Research and Quality assessment tool (AHRQ) (Williams et al., 2010). We downgraded an outcome by 1 point if three of the parameters in our risk of bias assessment had ≥50% studies with at least one 'no' or 'unclear' rating, and 2 points if four or more parameters had ≥50% studies with ratings of 'no or unclear'.

Imprecision

We downgraded an outcome for imprecision by 1 point if *"a recommendation or clinical course of action would differ if the upper versus the lower boundary of the CI represented the truth"* and/or the number of events and sample size meant the optimal information size was not reached (Guyatt et al., 2011).

Inconsistency

We downgraded an outcome for inconsistency by 1 point if the I^2 statistic was ≥40% in the context of an unclear direction of effect or ≥75% in the context of a clear direction of effect. We downgraded by 2 points if the I^2 statistic was ≥75% in the context of an unclear direction of effect.

Publication Bias

We downgraded an outcome for publication bias by 1 point when, for outcomes with at least 10 studies (Higgins & Green, 2011), the Doi plot and LFK index suggested major asymmetry (i.e., LFK index >2) and this was not better explained by selective reporting bias or some other factor. However, if the 'trim and fill' method indicated that any publication bias was not likely to affect the overall magnitude of the effect size, we did not downgrade.

Rating Up the Quality of Evidence

In the context of a large effect size, we upgraded by 1 point where the effect size calculated was large. Using Cohen's criteria (1988), an effect size of $r \geq 0.50$ or $d \geq 0.80$ was considered large.

M. Forest Plots of Meta-Analyses

Fig. M.1. Difference in Externalising Attributional Bias (EAB): Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

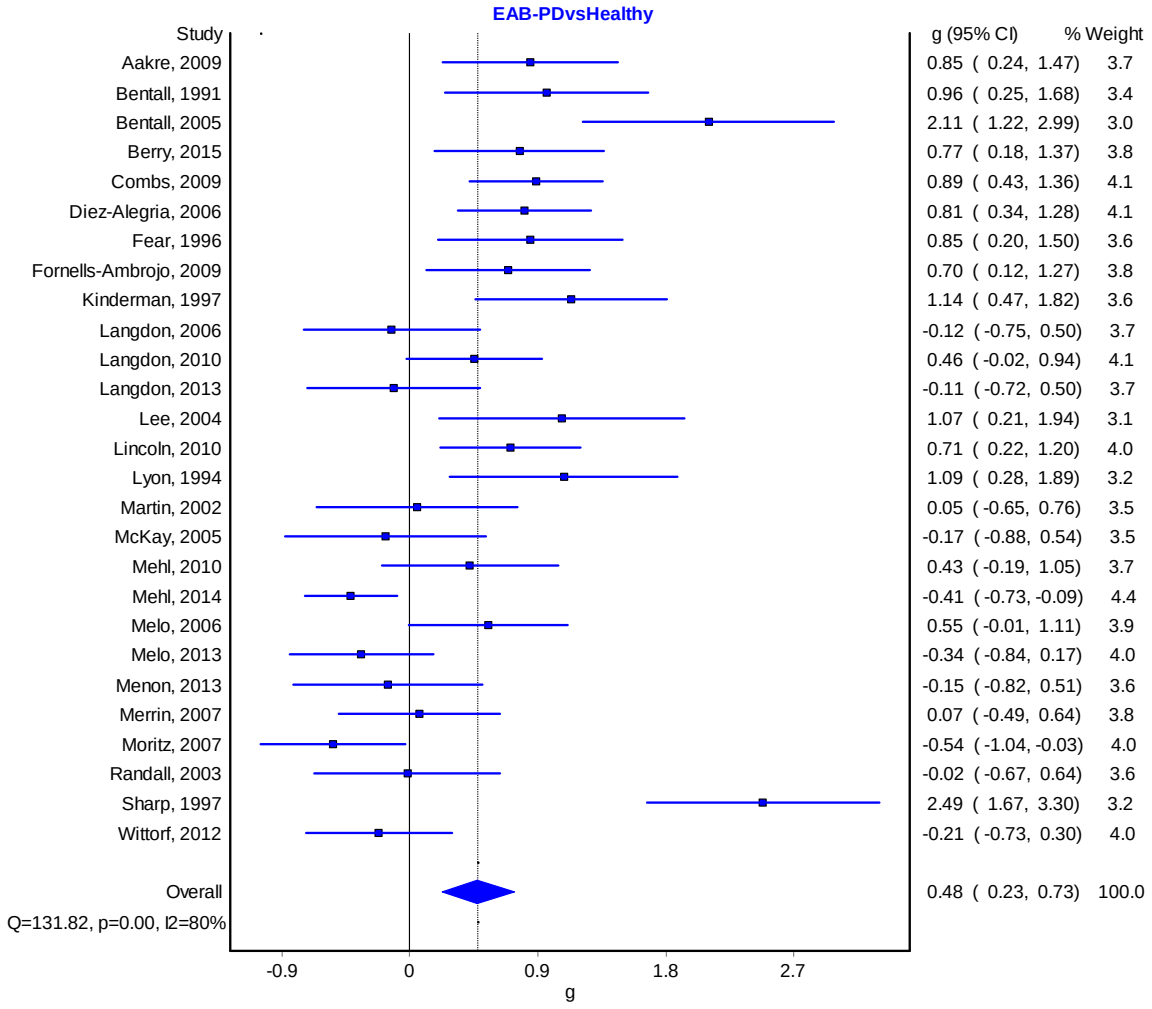


Fig. M.2. Difference in Externalising Attributional Bias (EAB): Psychosis With Persecutory Delusions (PDs) vs Depression (D)

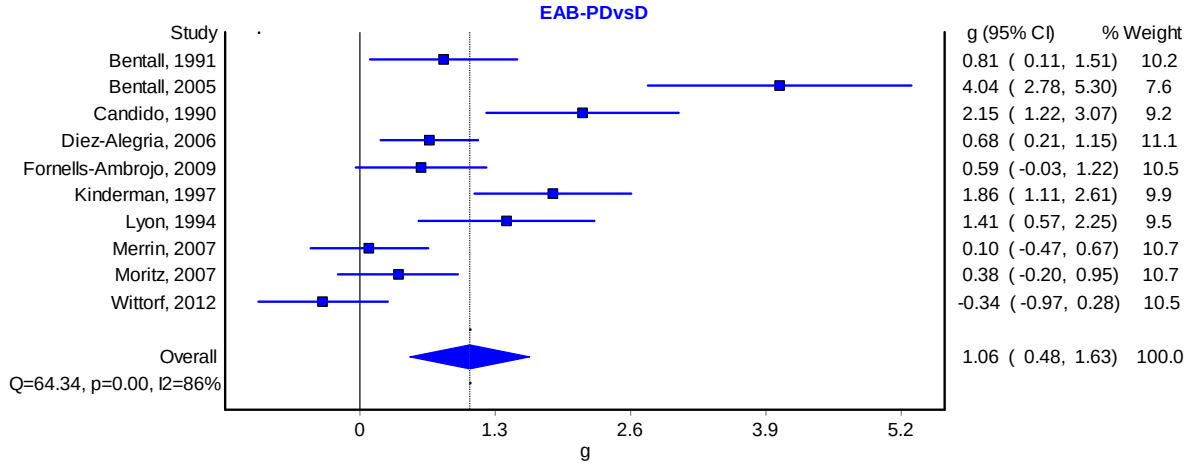


Fig. M.3. Difference in Externalising Attributional Bias (EAB): Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

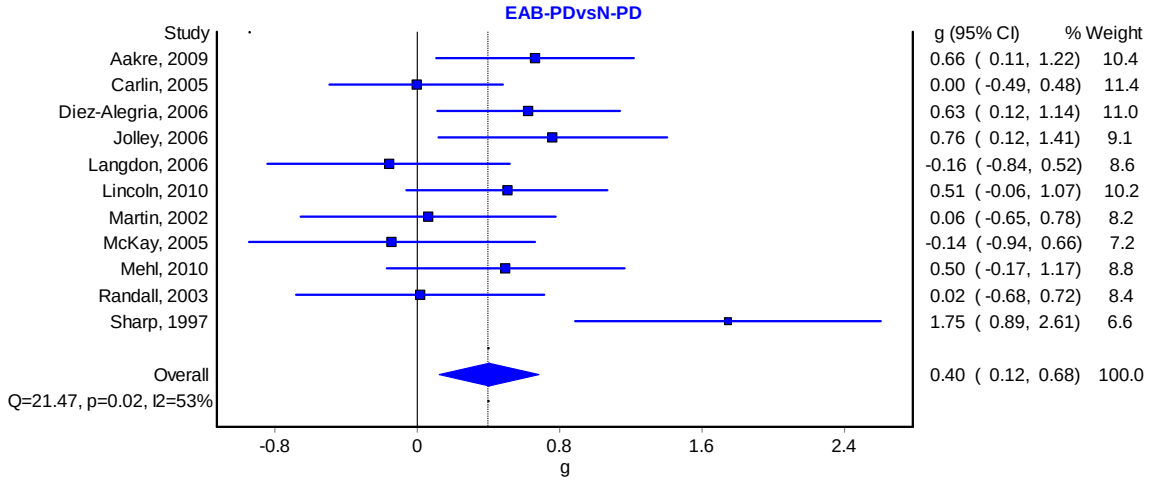


Fig. M.4. Correlation between Externalising Attributional Bias (EAB) and Paranoia Severity in People With Psychosis

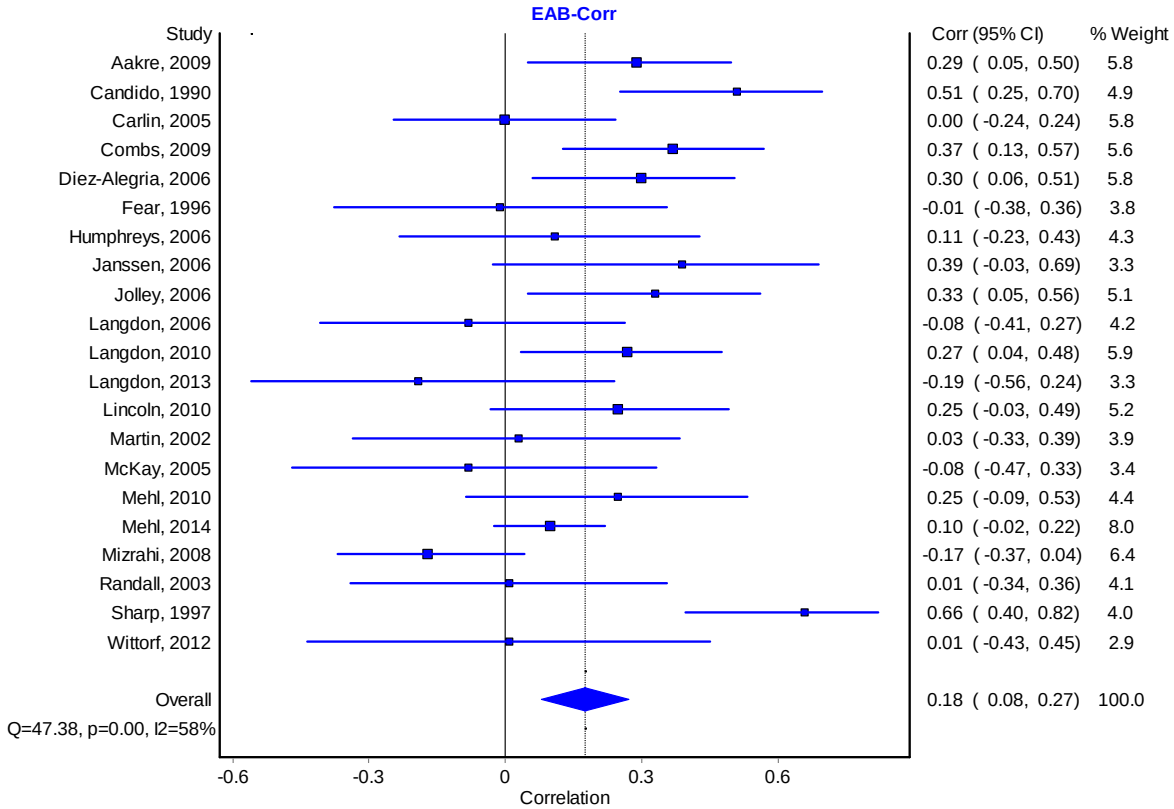


Fig. M.5. Difference in Explicit Self-Esteem (ESE): Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

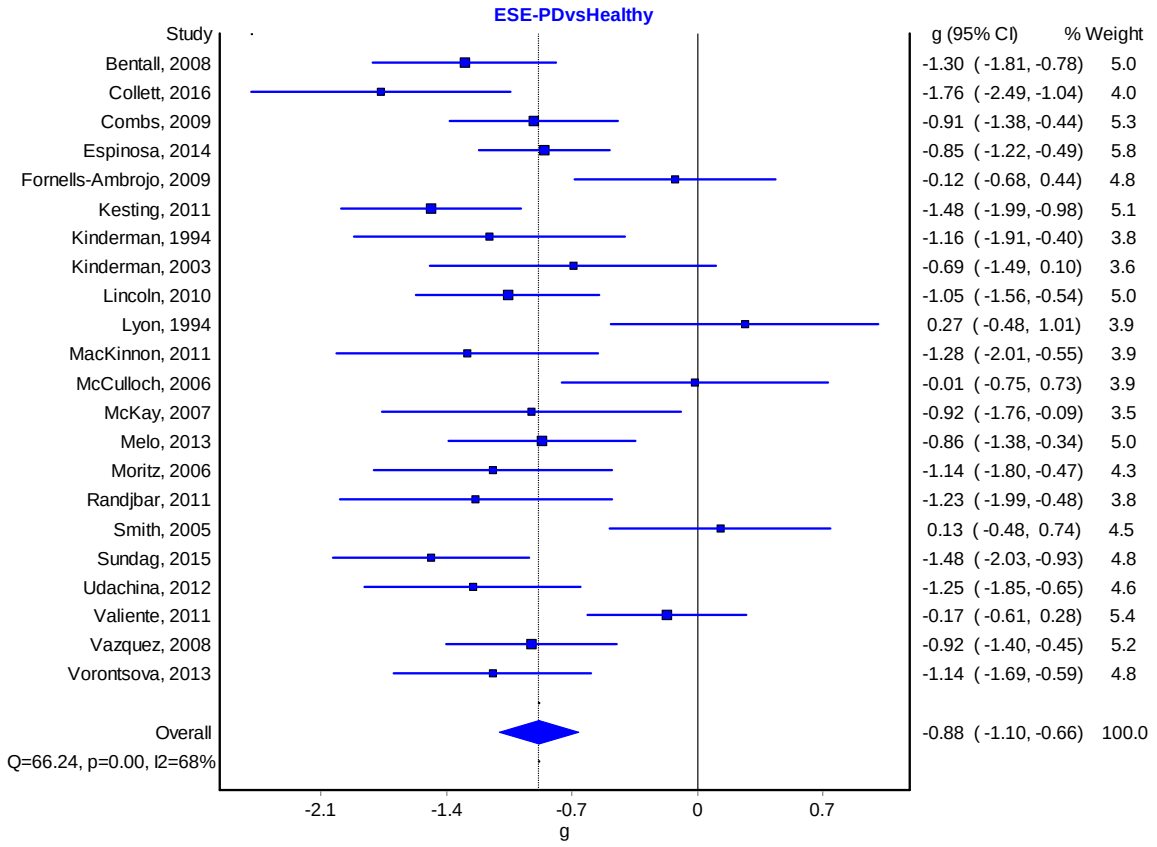


Fig. M.6. Difference in Explicit Self-Esteem (ESE): Psychosis With Persecutory Delusions (PDs) vs Depression (D)

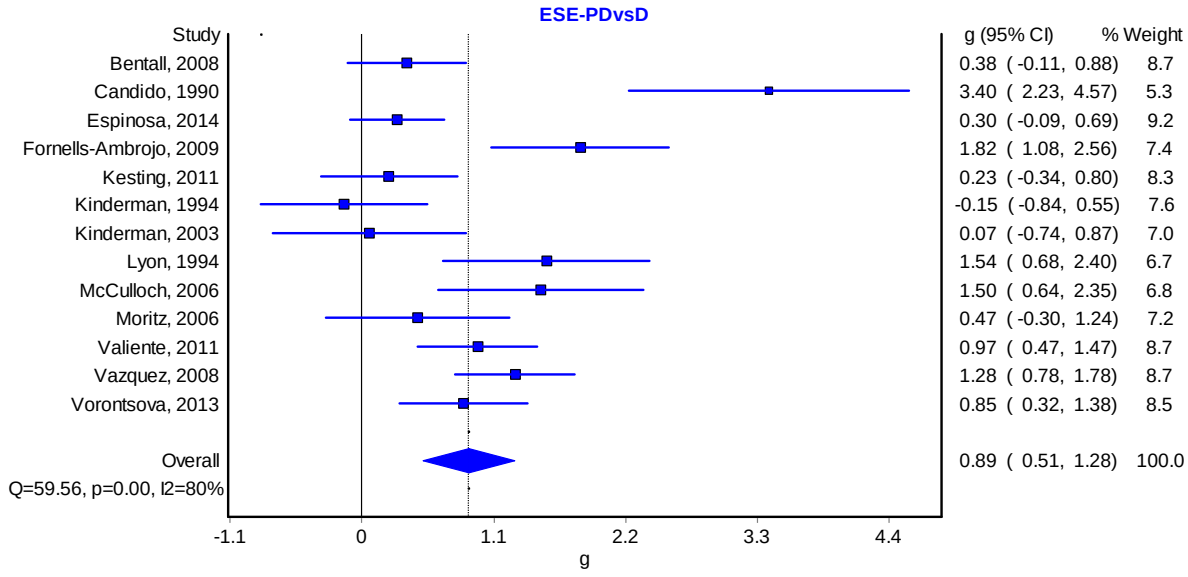


Fig. M.7. Difference in Explicit Self-Esteem (ESE): Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

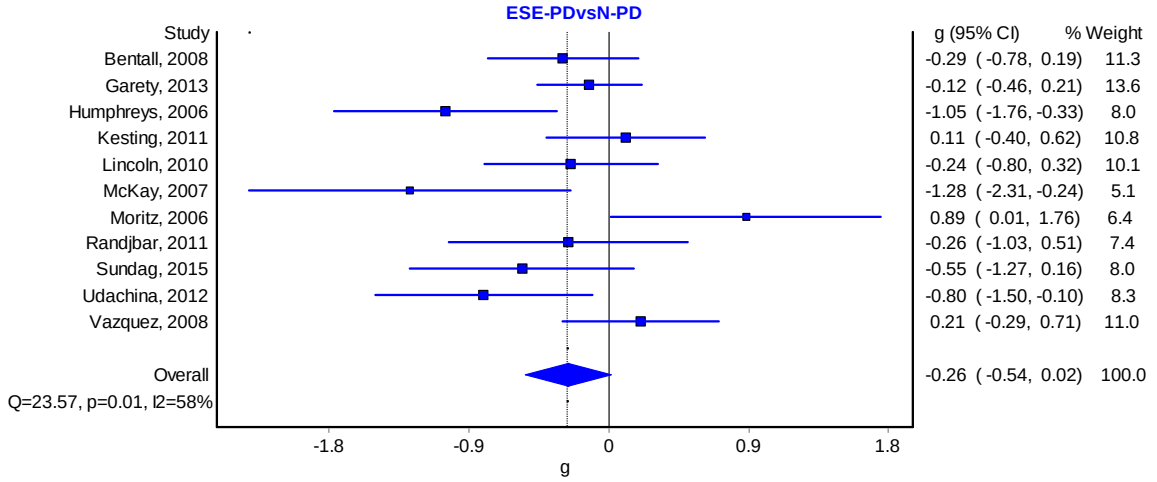


Fig. M.8. Correlation between Explicit Self-Esteem (ESE) and Paranoia Severity in People With Psychosis

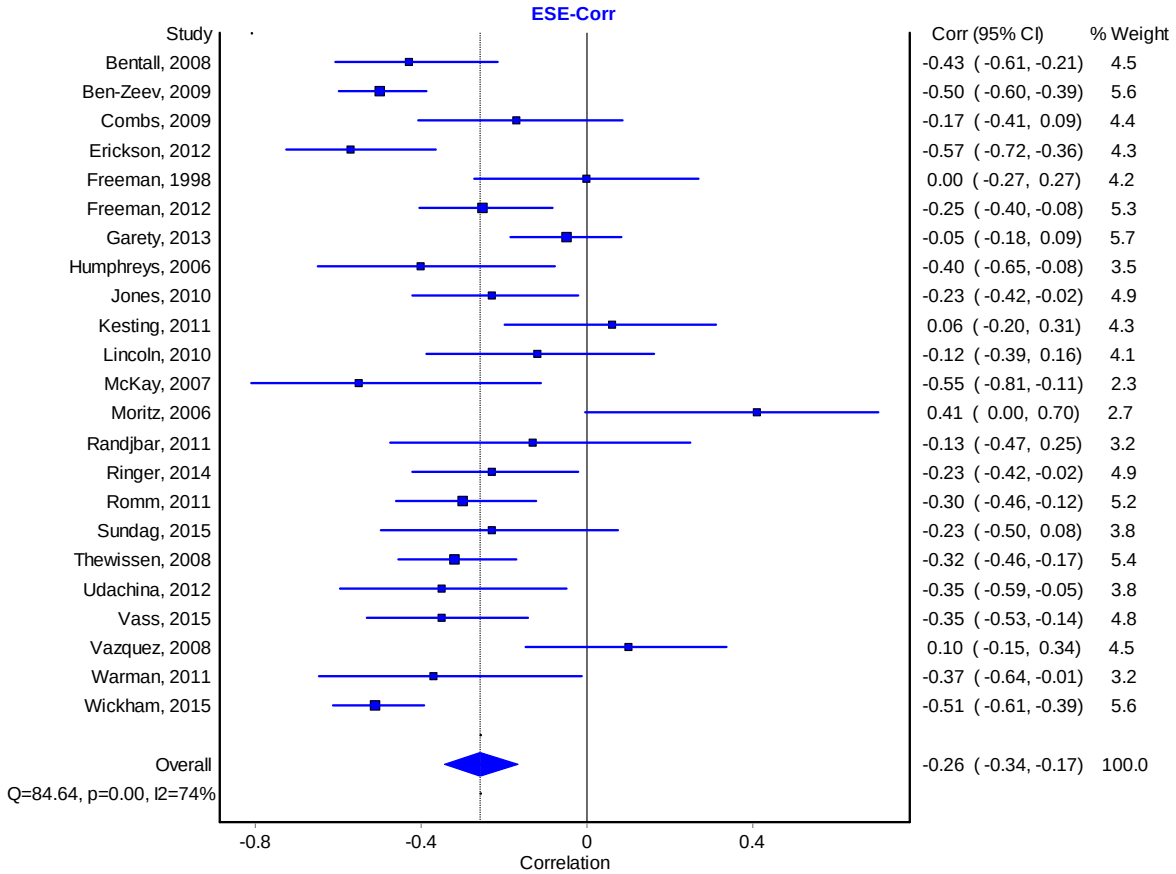


Fig. M.9. Difference in Implicit Self-Esteem (ISE): Psychosis With Persecutory Delusions (PDs) vs Healthy Controls

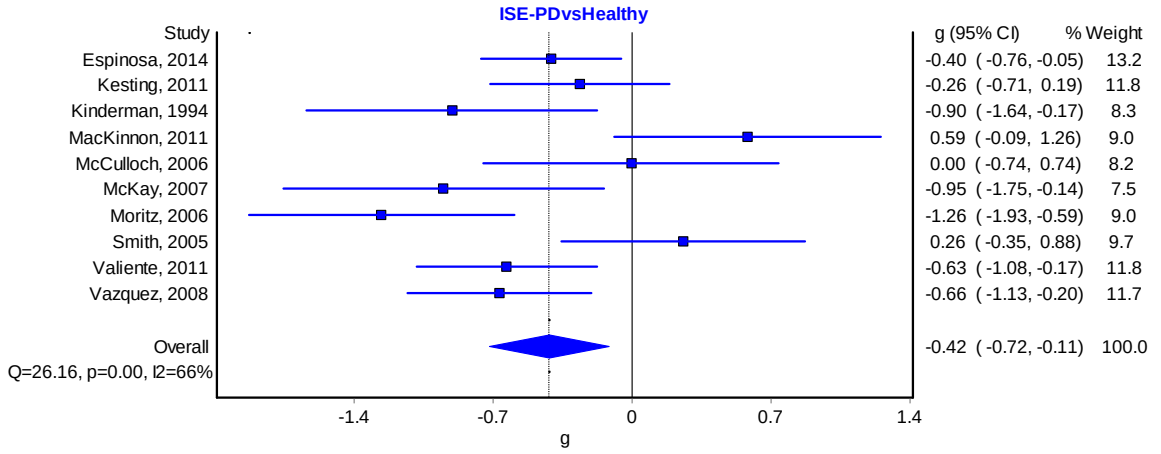


Fig. M.10. Difference in Implicit Self-Esteem (ISE): Psychosis With Persecutory Delusions (PDs) vs Depression (D)

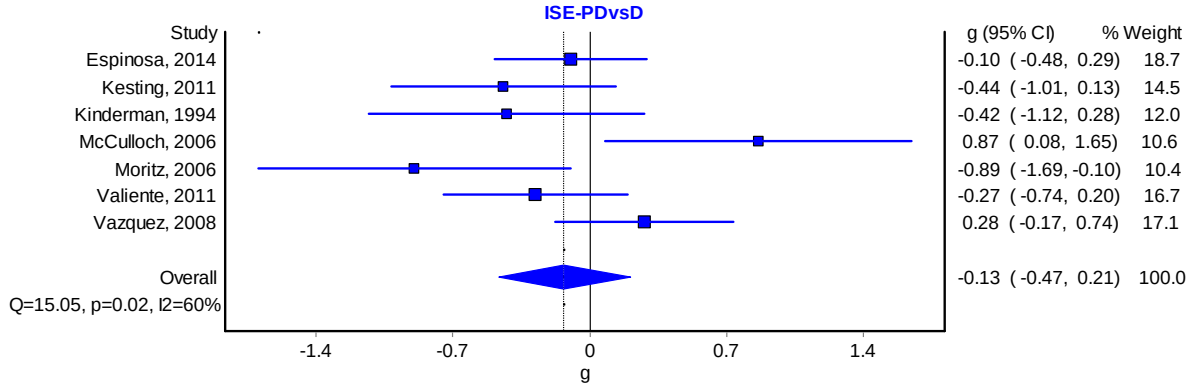


Fig. M.11. Difference in Implicit Self-Esteem (ISE): Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)

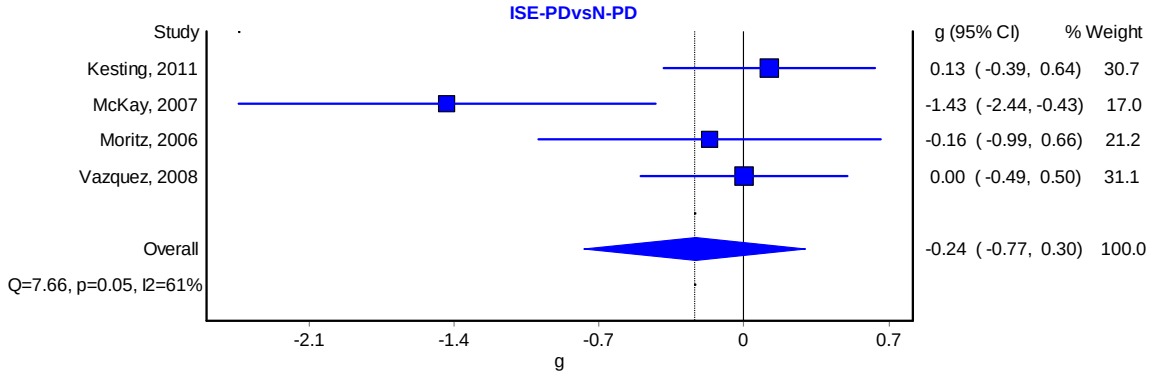


Fig. M.12. Correlation between Implicit Self-Esteem (ISE) and Paranoia Severity in People With Psychosis

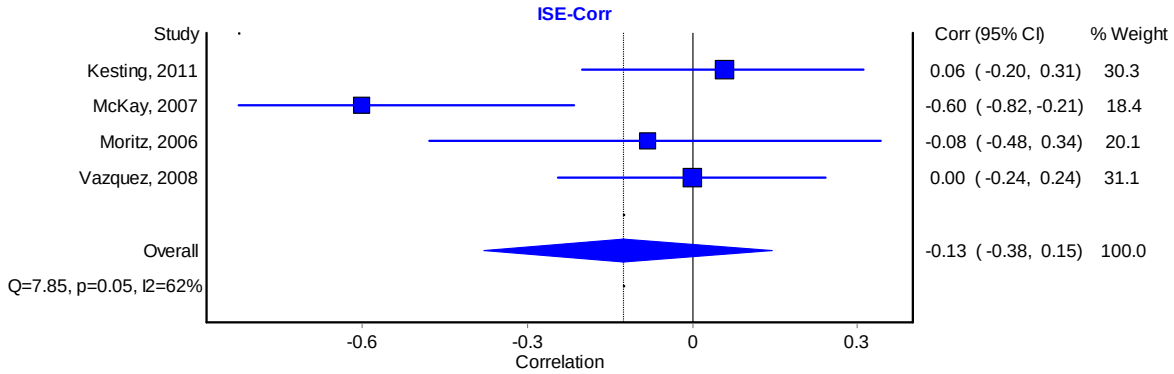
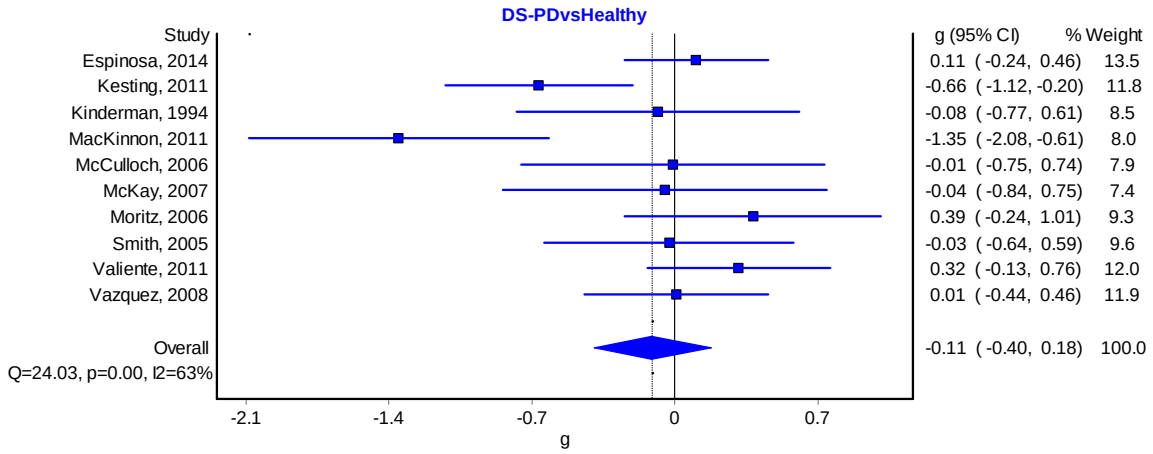
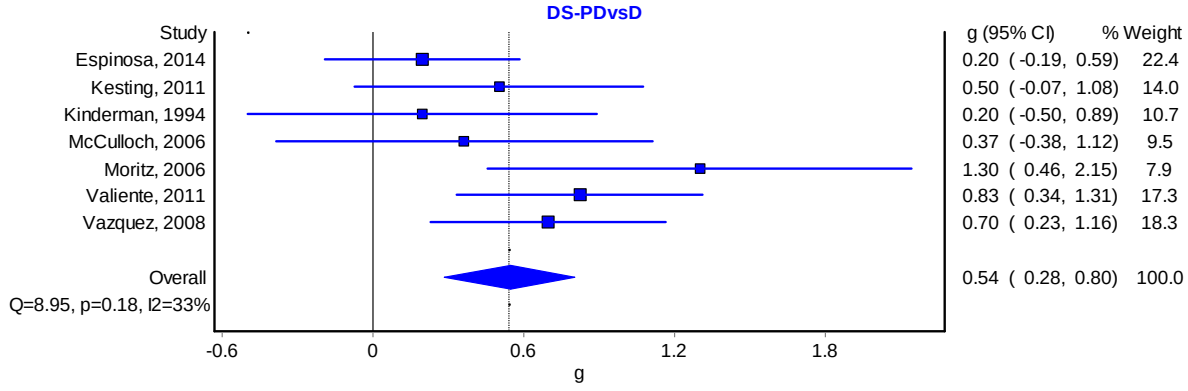


Fig. M.13. Difference in Discrepancy Scores (DS):[a] Psychosis With Persecutory Delusions (PDs) vs Healthy Controls



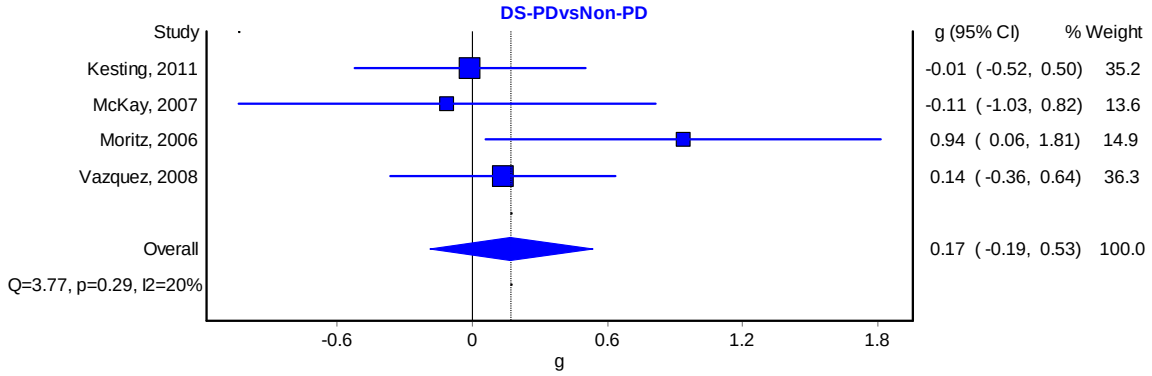
[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Fig. M.14. Difference in Discrepancy Scores (DS):[a] Psychosis With Persecutory Delusions (PDs) vs Depression (D)



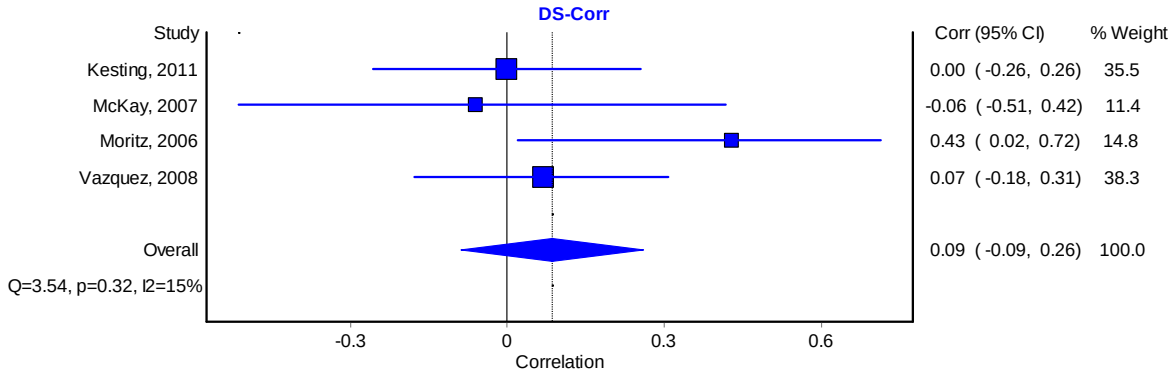
[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Fig. M.15. Difference in Discrepancy Scores (DS): Psychosis With Persecutory Delusions (PDs) vs Psychosis Without PDs (and, if Specified, Grandiose Delusions; GDs)



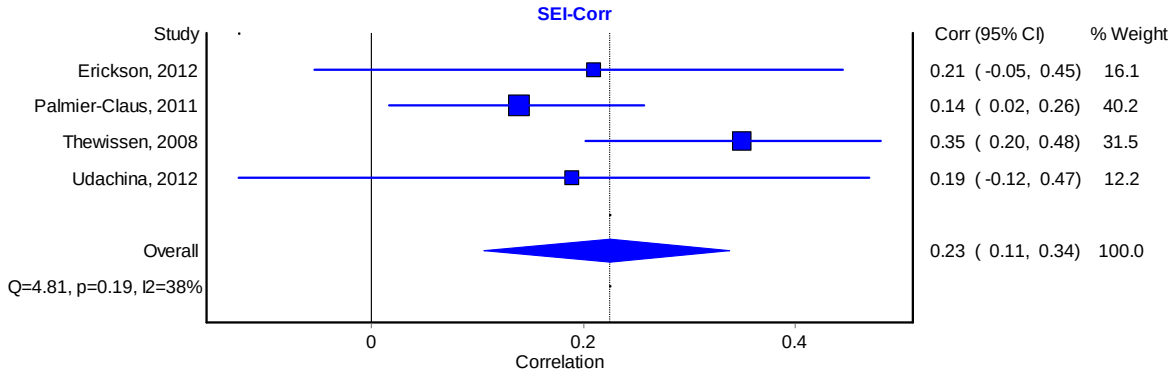
[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Fig. M.16. Correlation between Paranoia Severity and Discrepancy Scores (DS)[a] in People With Psychosis



[a]Discrepancy scores = scores on discrepancies between implicit and explicit self-esteem.

Fig. M.17. Correlation between Paranoia Severity and Self-Esteem Instability (SEI) in People With Psychosis



N. PRISMA Checklist

Section/topic	#	Checklist item	Reported
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Yes
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Yes
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	Yes
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Yes
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Yes
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Yes
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Yes

Section/topic	#	Checklist item	Reported
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Yes
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Yes
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Yes
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Yes
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Yes
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	Yes
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Yes

Section/topic	#	Checklist item	Reported
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Yes
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Yes

Section/topic	#	Checklist item	Reported
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Yes
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Yes
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Yes
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Yes
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Yes
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Yes
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Yes
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Yes
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Yes

Section/topic	#	Checklist item	Reported
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Yes
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

Chapter 2: Empirical Journal Article

A case series examining the feasibility and acceptability of psychological assessment and formulation of impaired treatment decision-making capacity in psychosis

Philip Murphy*, Suzanne O'Rourke, Robyn McRitchie, Karen Allan, Paul Hutton

*Corresponding author

Abstract

Aims: We used a simple case series design to examine the feasibility and acceptability of collaborative psychological assessment and formulation of impaired treatment decision-making capacity (TDMC) among patients with psychosis, and produce preliminary data on safety and efficacy.

Method: A formulation of impaired TDMC for 5 patient participants was developed and shared with 13 clinician participants. Acceptability, utility, working alliance and safety were assessed through pre and post self-report and interview measures.

Results: Three of the patient participants collaborated in the development of their formulation. They found the intervention safe and acceptable, following which they provided a much richer understanding of the factors that may impair their TDMC (Cohen's d = 2.16). Two patient participants only partially adhered to the intervention protocol, but a psychological formulation was still feasible to produce and no adverse effects were reported. Clinician participants provided a much richer understanding of the factors that may impair the patient participants' TDMC (Cohen's d = 1.36; 95% CI = 0.63 to 2.07) after the presentation of the case formulations. Increases in knowledge, confidence and positive attitudes regarding supporting the TDMC of patients were observed. They strongly believed that the formulations cohered with their knowledge of the patient participants and were comprehensive and accurate.

Conclusions: Patients with psychosis, and their clinicians, can be engaged in a collaborative psychological assessment and formulation of factors that may impair their TDMC. Initial data suggests this process is acceptable, safe and helpful.

INTRODUCTION

Treatment decision-making capacity (TDMC) has become an increasing target of scientific inquiry over the past two decades. This is linked to a shift away from the paternalistic role of healthcare professionals towards a greater emphasis on an individual's own treatment decisions (Schneider, 1998). Although TDMC has been variously defined, there is general agreement that it involves the following abilities in relation to proposed treatment: (1) understanding (i.e., comprehending the nature of the consent-relevant information), (2) appreciation (i.e., understanding how the information applies to one's own condition and situation), (3) reasoning (with the information provided), and (4) evidencing a choice (about participation versus non-participation without severe ambivalence) (Appelbaum & Grisso, 1988; Roth, Meisel, & Lidz, 1977). It is worth noting that Scotland has incorporated the concept of significantly impaired decision-making ability (SIDMA) as one of the grounds for compulsory treatment under the Mental Health (Care and Treatment) Act 2003 (the 2003 Act), although it does not apply to individuals who are treated under the 2003 Act having being accused of, or committed, an offence. The notion of SIDMA is hard to separate from impaired TDMC (Owen, Freyenhagen, Richardson, & Hotopf, 2009) so, for the purposes of this research, they will not be separately classified.

Based on surveys of clinicians, there appears to be an existing bias that assumes almost everyone with psychosis has impaired TDMC (Appelbaum & Grisso, 1995; Ganzini, Volicer, Nelson, Fox, & Derse, 2004). A review of empirical studies regarding capacity to consent to treatment and research showed that patients with schizophrenia are more likely to have reduced capacity relative to other psychiatric disorders and medical problems, although only a minority of these patients performed poorly on any one of the four abilities relating to capacity (i.e. evidencing a choice, understanding, reasoning, and appreciation) (Sturman, 2005). Another review of empirical studies demonstrated a substantial heterogeneity in decision-making capacity for treatment and research among patients with schizophrenia, as well as among non-psychiatric comparison subjects (NPCs) (Jeste, Depp, & Palmer, 2006). One identified source of variability in capacity among patients with schizophrenia was whether the sample was drawn from inpatient or outpatient settings, as outpatients were much closer to NPCs in performance on capacity measures. These reviews suggest that the presence of schizophrenia does not necessarily mean that the patient has impaired TDMC although it is a risk factor for such.

If a situation causes a clinician to assess TDMC, he or she will usually have difficulty applying standards suggested in the literature and will proceed using unstructured professional judgement (Markson, Kern, Annas, & Glantz,1994). However, instruments using structured professional judgements have recently improved the reliability of such assessments (Cairns *et al*., 2005; Okai *et al*., 2007). The MacArthur Competence Assessment Tool – Treatment (MacCAT-T) is the most widely used of these instruments and has received the most empirical support (Dunn *et al*., 2006). It is a semi-structured interview measuring understanding, reasoning and appreciation in relation to proposed treatment. In addition, it records whether the patient is able to make a choice or not. The instrument does not give a total score and the abilities are considered distinct, nor is it designed to provide, by itself, a simple binary (pass/fail) capacity assessment. However, in combination with a clinical interview, the MacCAT-T can be used to produce extremely reliable binary judgements of TDMC (Cairns *et al*., 2005). Moreover, it is worth noting that different assessments of TDMC can yield different results; for example, in a comparative empirical study, substantially more patients with schizophrenia were classified as impaired using the objective MacCAT-T than by clinical assessment alone (Vollmann, Bauer, Danker-Hopfe, & Helmchen, 2003).

In the psychiatric literature, there are four areas that stand out as being particularly relevant in the assessment of decision-making capacity: (1) insight and neuropsychological functioning, (2) disorder of thinking (which incorporates delusions), (3) disorders of emotion (including anxiety, depression and mania), and (4) risk (Owen *et al*., 2009). Therefore, it stands to reason that an assessment of TDMC should incorporate these factors. Indeed, British Psychological Society (BPS) guidance on how to assess capacity in general suggests that these factors should be evaluated within the assessment of capacity (BPS, 2006). BPS guidance also suggests that other aspects of the individual should be considered, including systemic, interpersonal and contextual factors (BPS, 2006). Moreover, within the area of delusions and psychosis, cognitive and affective processes have been identified as contributing to the delusional experience (Garety & Freeman, 2013), and consequently these may affect TDMC. With regard to cognitive processes, there is substantial evidence that people with delusional beliefs have a "jumping to conclusions" (JTC) bias (Dudley, Taylor, Wickham, & Hutton, 2016) as well as an externalizing attributional bias (Murphy, Bentall, Freeman, O'Rourke, & Hutton, in preparation). Regarding affective processes, worry and low self-esteem in addition to anxiety and depression have been shown to be present in individuals with delusions (Garety & Freeman, 2013).

Psychological formulations provide a framework for drawing together the range of different factors that might affect a given problem (Kinderman, 2005). Of note, a cognitive model of impaired TDMC in psychosis has just been developed by Hutton *et al*. (in preparation), which can be used to guide formulations. This model, which integrates a number of recent developments in our understanding of factors affecting cognition in psychosis, proposes that there are 3 semi-independent pathways to impaired TDMC in psychosis: (1) an appraisal-based pathway, whereby delusional appraisals (e.g., "hospital staff are trying to control my thoughts") of internal and external experiences directly compromise TDMC via effects on appreciation of treatment-related information; (2) a cognitive resources pathway, whereby biased cognitive processing and depleted cognitive resources directly compromise TDMC via effects on understanding, reasoning and retention of treatment-related information; and (3) an emotion pathway, whereby emotional arousal, caused by appraisals and cognitive perseveration, directly and indirectly compromise TDMC via effects on understanding, reasoning and communication of treatment-related information. Each pathway is influenced by metacognitive awareness and beliefs related to cognitive resources (see **Figure 1**).

Although reliable assessments of TDMC have been developed (Cairns *et al.*, 2005; Okai *et al.*, 2007), no attempts have yet been made to develop a structured protocol for both assessing and formulating TDMC among patients with psychosis. Such a protocol might be used to construct formulations of the factors that help or hinder TDMC in these patients which might in turn inform intervention strategies aimed at restoring TDMC. To address this gap in the literature, the overall aim of this research was to conduct a case series to develop and pilot test a structured protocol for assessing and formulating impaired TDMC among patients with psychosis while being guided by the cognitive model of Hutton *et al*. (in preparation). More specifically, the primary aim of this research was to examine the feasibility and acceptability of assessing and formulating impaired TDMC among patients with psychosis, and produce preliminary data regarding utility/efficacy and safety. The secondary aim of this research was to produce hypotheses regarding factors that might help or hinder TDMC in these patients.

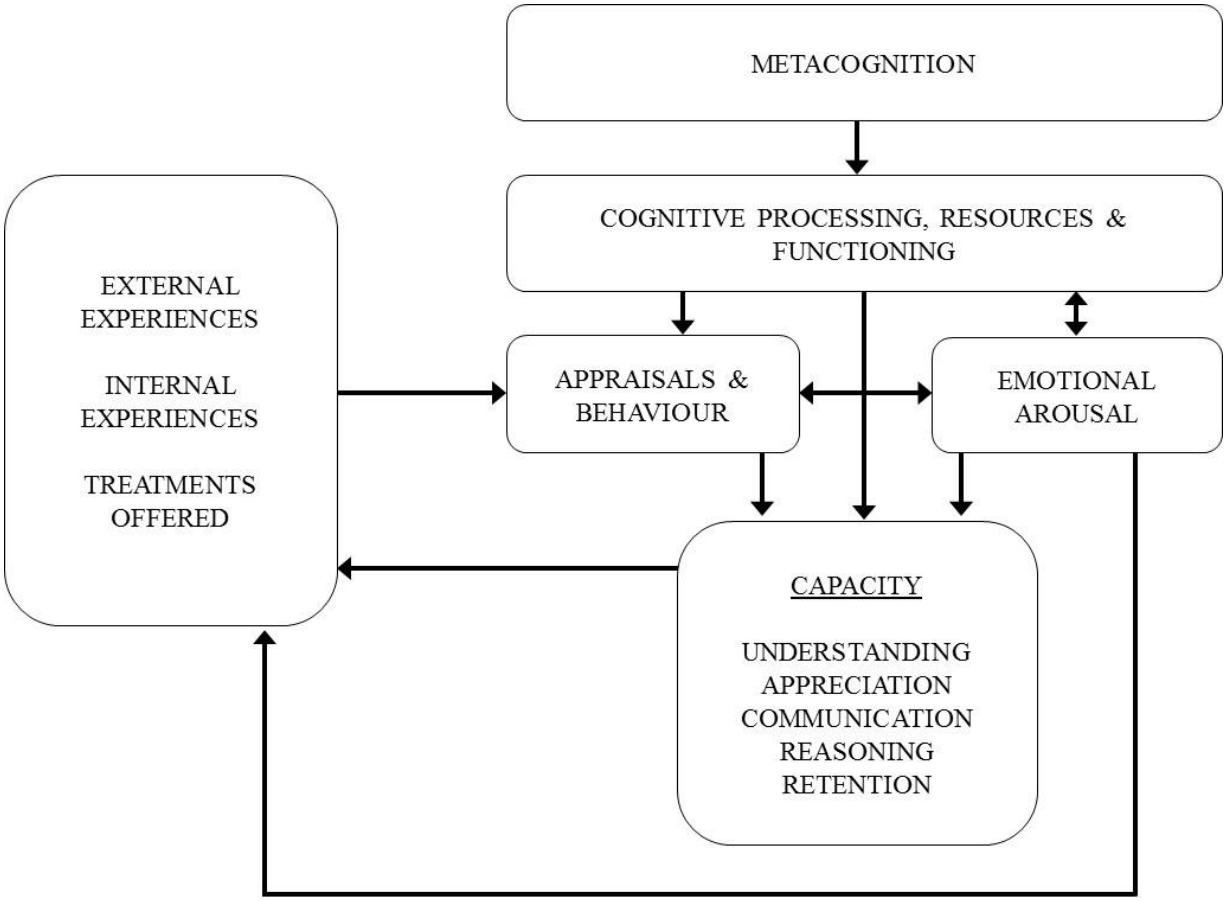


Figure 1. A cognitive model of impaired TDMC by Hutton *et al*. (in preparation)

METHOD

Study Design

We used a simple case series design to (a) examine the feasibility, acceptability, utility/efficacy and safety of psychological assessment and formulation of impaired TDMC in patients with psychosis, and (b) generate hypotheses regarding factors that may help or hinder TDMC in this group.

Participants

An analysis of the concept of "case series", which included 586 articles, suggests that a case series should have more than 4 patients while 4 patients or less should be reported individually as case reports (Abu-Zidan, Abbas, & Hefny, 2012). With this recommendation in mind, our aim was to recruit at least 5 patient participants. We also aimed to recruit clinician participants involved in their care.

Our inclusion criteria for patient participants were as follows: (a) aged over 18 years; (b) able to be interviewed and complete the measures; (c) diagnosed with a schizophrenia-spectrum disorder (verified through patients' notes); (d) enrolled as a patient (i) in a forensic mental health service in North East Scotland (Site 1) or (ii) in the IPCU or one of the other wards in a non-forensic mental health hospital in Central Scotland (Site 2); (e) presumed or already judged to have impaired TDMC.

Patient participants were unable to take part if they: (a) had moderate to severe learning disability; (b) had psychosis of predominantly organic origin (e.g., brain injury, physical health condition, epilepsy) or had a primary diagnosis of substance or alcohol use disorder; (c) could not understand English sufficiently to engage in conversation without an interpreter.

In regards to clinician participants, our inclusion criteria were as follows: (a) aged over 18 years and able to provide informed consent; (b) able to complete the measures; (c) working as a multi-disciplinary team member in Site 1 or Site 2; (d) familiar with the patient participant in the case presentation and have attended at least one of the case presentations. Non-consenting clinicians were excluded from the study.

Ethical Approval

Initially, ethical approval was granted by the West of Scotland NHS Research Ethics Committee (REC), who could only give us permission to recruit patient participants who had research participant capacity as well as clinician participants involved in their care. Subsequently, ethical approval was granted by a "flagged" REC, namely the Scotland A REC. They also gave us permission to recruit patient participants who lacked research participant capacity as well as clinician participants involved in their care. It should be noted that TDMC is considered distinct from research participant capacity, and impaired TDMC does not automatically imply that the patient lacks research participant capacity. Indeed, in this case, research participant capacity was judged by both RECs to represent a lesser cognitive burden than TDMC. This is in accordance with other research on TDMC (Fernandez, Kennedy H., & Kennedy M., 2017). Nevertheless, we had permission to recruit patient participants with or without research participant capacity as well as clinician participants involved in their care.

Outcomes

We explored a number of outcomes regarding both patient and clinician participants to address the research questions.

Feasibility

The feasibility of including patient participants in the intervention and its evaluation was assessed by measuring the recruitment rate of patient participants, the retention rate of patient participants once recruited, the degree to which patient participants adhered to the study procedures including the intervention protocol (i.e., the assessment and formulation process) and post-intervention assessment, and the degree to which it was possible to develop collaborative formulations of impaired TDMC.

Collaboration or alliance between the researcher and patient participants according to the patient participants was measured using the Working Alliance Inventory (WAI), an adaptation of the WAI – Short Form (Tracey & Kokotovic, 1989), at post-intervention. This is a 9-item patient-rated scale, with each item rated on a 7-point Likert scale. It has 3 subscales: the *task* subscale containing 3 items focusing on agreement of the researcher and patient on tasks (e.g.,

"The researcher and I agreed about the things I did during the sessions"), the *goal* subscale containing 2 items focusing on the goals or outcome of the intervention (e.g., "The researcher and I worked towards mutually agreed upon goals") and the *bond* subscale containing 4 items focusing on the extent to which there was a positive personal attachment or bond in the relationship (e.g., "The researcher and I trusted one another"). The rating for one of the goal items is reversed. Possible total scale scores can range from 9 to 63, and higher scores are indicative of more positive perceptions of the working alliance.

To assess the feasibility of including clinicians in the intervention and evaluation processes, we also assessed the number of case formulation presentations, the number of clinicians who attended the presentations, the recruitment rate of clinician participants from those who attended the presentations and the degree to which clinician participants completed the research measures.

Acceptability

Acceptability of the intervention to patient participants was measured by the Acceptability Questionnaire (AQ), an adaptation of the Treatment Acceptability Rating Scale (Hunsley, 1992), at post-intervention. This is an 8-item patient-rated scale, with each item rated on a 7-point Likert scale. The items focus on overall satisfaction with the sessions, involvement in planning the sessions, ability to change the plan of the sessions, acceptability of the different tasks, negative consequences of the sessions, helpfulness of the formulation, and the researcher's knowledge and trustworthiness. The rating for the negative consequences item is reversed and the ratings are then summed to yield an overall score. Possible scores can range from 8 to 56, and higher scores are indicative of higher acceptability.

Acceptability of the case formulation presentations according to clinician participants was measured by 3 items on the 9-item post-formulation Case Formulation Scale (post-CFS). These items, rated on a 5-point Likert scale (from 0, which is "not at all", to 4, which is "very much"), focus on the degree to which the formulation coheres with the clinician participants' knowledge of the patient participant as well as the degree to which the formulation was comprehensive and accurate as perceived by the clinician participants.

Preliminary Utility/Efficacy

For patient participants, utility/efficacy of the intervention was assessed by using the Reasons for Incapacity Questionnaire – Patient Version (RIQ-P) at baseline and post-intervention. This is a simple patient questionnaire which asks patient participants why they think they were presumed or judged to be unable to make their own treatment decisions. The reasons they give, and the degree to which they believe these reasons (recorded using a 0-100% conviction rating scale) are captured.

Utility/efficacy of the intervention was measured using the Incapacity Knowledge Impression Scale – Patient Version (IKI-P), an adaptation of the Clinical Global Impression Scale (Guy, 1976), at baseline and post-intervention. This is a 6-point Likert scale (from 1, which is "not at all knowledgeable", to 6, which is "extremely knowledgeable"), where patient participants are asked to rate their knowledge of the factors which help or prevent them from making their own decisions about their treatment. In addition to the patient version, a researcher version (IKI-R) was used at baseline and post-intervention. This captures the researcher's perception of the patient participants' knowledge/insight of the aforementioned factors. At post-intervention, the Incapacity Knowledge Impression – Improvement Scale – Researcher Version (IKI-I-R), an adaptation of the Clinical Global Impression – Improvement Scale (Guy, 1976), was also used. This is a 7-point Likert scale (from 1, which is "very much worse", to 7, which is "very much improved") that captures the researcher's perception of whether the patient participants' knowledge/insight of the aforementioned factors have improved since baseline.

Utility/efficacy of the case formulation presentations according to clinician participants was assessed by using the Reasons for Incapacity Questionnaire – Clinician Version (RIQ-C) at pre- and post-formulation. This is a simple clinician questionnaire which asks clinician participants why they think the patient participant was presumed or judged to be unable to make their own treatment decisions. The reasons they give, and the degree to which they believe these reasons (recorded using a 0-100% conviction rating scale) are captured.

Utility/efficacy of the case formulation presentations was also measured using the pre- and post-formulation CFS (pre-CFS and post-CFS). All of the 6 items that consist of the pre-CFS are incorporated into the 9-item post-CFS; these 6 items are relevant to utility/efficacy. These items, rated on a 5-point Likert scale (from 0, which is "not at all", to 4, which is "very much"), focus on: *knowledge* regarding the aetiology and maintenance of incapacity of the patient participant as well as possible interventions/strategies to support the capacity of the patient

participant (2 items), *confidence* regarding supporting the capacity of the patient participant (one item), and *attitudes* regarding supporting capacity – both in general and specifically with regard to the patient participant (3 items).

Preliminary Safety

Safety of the intervention was assessed using widely used measures of depression and global illness severity at baseline and post-intervention, as well as a measure of potential adverse effects from intervention involvement at post-intervention or point of discontinuation. In regards to depression, this was measured using the Calgary Depression Rating Scale for Schizophrenia (CDSS; Addington, D. & Addington, J., 1990), which is designed to reflect the presence of depression exclusive of other dimensions of psychopathology in people with schizophrenia. This is a brief interview administered by the researcher and consists of 8 structured questions followed by one observation item. Possible scores can range from 0 to 27, and higher scores are indicative of higher depressive symptoms.

In relation to global illness severity, this was assessed using the Clinical Global Impression Scale (Guy, 1976) (here called the CGI-R). This is a 7-point Likert scale (from 1, which is "normal, not at all ill", to 7, which is "extremely ill"), that captures the researcher's perception of the severity of the patient participants' mental health difficulties. In addition to the researcher version, a patient version (CGI-P) was used to obtain the patient participants' perception of the severity of their mental health difficulties. At post-intervention, the CGI – Improvement Scale (Guy, 1976) (here called the CGI-I-R) was also used. This is a 7-point Likert scale (from 1, which is "very much improved", to 7, which is "very much worse") that captures the researcher's perception of whether the patient participants' mental health difficulties have improved or deteriorated since baseline.

With regard to potential adverse effects from intervention involvement, these were assessed using the Adverse Effects Questionnaire (AEQ), an adaptation of a measure used in a large multi-centre trial of cognitive behavioural therapy (CBT) for clozapine-resistant psychosis (Pyle *et al*., 2016). The version of the AEQ for intervention completers is a 26-item patient-rated scale, with each item rated on a 5-point Likert scale (from 0, which is "not at all", to 4, which is "very much"). The items focus on the following broad categories: worsening difficulties; poor engagement (including low motivation); situational change; not getting better; stigma; increased conflict with others (care team, family etc.). The version of the AEQ for

intervention discontinuers has an extra item related to feeling better, the rating of which is reversed. Possible scores for the intervention completer version and the intervention discontinuer version can range from 0 to 104 and 0 to 108 respectively, and higher scores are indicative of potentially greater adverse effects from intervention involvement.

Development regarding Hypotheses that Help/Hinder TDMC

A narrative description and summary of the process and outcome of the intervention was also provided for each patient participant, as per other case series work in psychosis (e.g., Maddox *et al.,* 2013; Morrison, 2001).

This was planned in order to (a) help readers judge the feasibility, utility and potential efficacy/safety of the overall intervention, (b) understand the clinical issues which were presented and the processes involved in delivering and evaluating the intervention, and (c) provide a clear rationale for any hypotheses regarding factors that help or hinder TDMC in this group.

Procedure

Following the recruitment and consent process, the intention was for the primary researcher at each site (PM in Site 1 and PH in Site 2) to conduct a baseline assessment with patient participants by administering some brief measures. These included a form to collect demographic and other clinical information as well as the aforementioned measures of patient participants' reasons for incapacity (RIQ-P), patient participants' impression of their knowledge of incapacity (IKI-P), patient participants' global illness severity impression (CGI-P) and depression (CDSS). The researcher reviewed the case notes of patient participants in advance of this assessment (having already obtained consent to do so) to avoid asking any unnecessary questions. Moreover, just after this assessment, the researcher completed some brief measures independently based on his observations of patient participants during the assessment; these included the aforementioned measures of patient participants' knowledge/insight of incapacity (IKI-R) and global illness severity (CGI-R), from the perspective of the researcher.

The intervention then commenced. The intention was for this to be as collaborative as possible, and to be conducted over several sessions by the primary researcher using (a) a comprehensive cognitive-behavioural interview, and (b) a set of structured assessments (including interviews, questionnaires, computer and other tasks). More information about the intervention is provided below.

The information obtained from the cognitive-behavioural interview and set of structured assessments was used to collaboratively construct formulations of the factors that may help or hinder TDMC for the patient participants. As mentioned, these formulations were guided by a cognitive model of impaired TDMC in psychosis (Hutton *et al*., in prep.), as already outlined and depicted in **Figure 1**. Potential strategies for restoring TDMC were derived from the formulations. The formulations, along with the potential strategies for restoring TDMC, were then shared with the clinical team if the patient participants agreed to this.

With the patient participants' agreement, the primary researcher shared the resulting formulations with the clinician participants and the rest of the clinical team during a multi-disciplinary 'formulation meeting'. Only one case formulation was presented at each meeting. Clinician participants were asked to complete the aforementioned CFS and the measure of clinician participants' reasons for incapacity (RIQ-C) before and after the formulation meeting. They were also asked to complete a form so basic demographic information could be collected.

Finally, the primary researcher invited the patient participants to attend a post-intervention assessment, where a number of brief measures could be administered, including the aforementioned measures of working alliance (WAI), acceptability (AQ) and adverse effects (AEQ), as well as the measures that were administered at baseline: RIQ-P, IKI-P, CGI-P and CDSS. Just after this assessment, the researcher completed some brief measures independently based on his observations of patient participants during the assessment; these included the measures that were completed at baseline (IKI-R and CGI-R) as well as the aforementioned measures of improvements with regard to patient participants' knowledge/insight of incapacity (IKI-I-R) and global illness severity (CGI-I-R), from the perspective of the researcher. Moreover, the primary researcher invited any patient participants who dropped out of the intervention early to complete the AEQ.

Intervention (i.e., Assessment and Formulation Process)

The intention was for the primary researcher at each site to conduct the intervention with patient participants. The aim was that the intervention would take place for up to six sessions of approximately one hour's duration. A break was scheduled during each session, and patient participants were informed that they could request an additional break at any point.

Each of these sessions consisted of (a) a cognitive behavioural interview and (b) a set of structured assessments (including interviews, questionnaires, computer and other tasks) which were known or hypothesised to contribute to impaired TDMC. The cognitive-behavioural interview allowed: (i) the results from the previous session's structured assessments to be interpreted and discussed with the patient participants; (ii) a rationale for those measures administered in the current session to be shared; (iii) a collaborative formulation of impaired TDMC to be developed (see below). Thus, the assessment and formulation became gradually more comprehensive as the sessions progressed. Below is a narrative description of the content of each session, detailing which structured assessments were due to be administered. **Table 1** also shows an outline of how the intervention might progress.

Session 1

Cognitive-behavioural interview

The Personal Beliefs about Experience Questionnaire (PBEQ: Pyle et al., 2015)

The MacArthur Competence Assessment Tool – Treatment (MacCAT-T: Grisso et al., 1997)

Session 2

Cognitive-behavioural interview

The Brief Core Schema Scale (BCSS: Fowler et al., 2006)

The Positive and Negative Syndrome Scale (PANSS: Kay, Fiszbein, & Opler, 1987)

Session 3

Cognitive-behavioural interview

The Brief Neurocognitive Assessment (BNA: Fervaha et al., 2015)

The Beads Task (Garety, Hemsley, & Wessely, 1991; Phillips & Edwards, 1966)

The Cognitive Biases Questionnaire for psychosis (CBQp: Peters et al., 2014)

Session 4

Cognitive-behavioural interview

The abbreviated version of the Scale to assess Unawareness in Mental Disorder (SUMD: Michel et al., 2013)

The short-form version of the Depression Anxiety Stress Scale (DASS-21: Lovibond & Lovibond, 1995)

The Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1965)

The Penn State Worry Questionnaire (PSWQ: Meyer, Miller, Metzger, & Borkovec, 1990)

The Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006)

Session 5

Cognitive-behavioural interview

The Attributional Style Questionnare parallel form (ASQpf: Lyon, Kaney, & Bentall, 1994)

The Emotional Stroop Task

The Young Mania Rating Scale (YMRS: Young, Biggs, Ziegler, & Meyer, 1978)

Session 6

Cognitive-behavioural interview

Below is a description of the aforementioned measures that were administered as part of the intervention. Only a brief a description of the structured assessments is provided below due to

space constraints, although a more detailed description of these assessments is provided in the Protocol in the Appendix.

Cognitive-Behavioural Interview

Patient participants were assessed using a comprehensive cognitive-behavioural interview with a strong collaborative focus. Elements of such an interview are well described by Morrison, Renton, Dunn, Williams, & Bentall (2004), and detailed guidance on working collaboratively in psychosis is provided by Hutton & Morrison (2013). The interview focuses on the role of cognitive appraisals of information relevant to the decision which the patient participants have been judged to lack capacity to make, and whether these appraisals help or hinder TDMC, and the role of affective (e.g., anxiety) and behavioural responses (e.g., avoidance) linked to these cognitive appraisals. Whether these affective and behavioural responses serve to maintain conviction or preoccupation with key appraisals are examined in collaboration with the patient participants.

The contribution of pre-existing beliefs or "schemata" are also investigated in a collaborative manner and included in the formulations, including positive and negative beliefs about psychotic phenomena, and positive and negative beliefs about their diagnosis. Relevant beliefs about self, others and the world are also examined, as are the potential role and origin of cognitive processes, such as worry, rumination and self-criticism. The patient participants' particular strengths are also assessed using the Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006), and incorporated into the formulations where possible.

The above information, together with information from the set of structured assessments, were used to collaboratively construct formulations of the factors that may help or hinder TDMC for the patient participants. As mentioned, these formulations were guided by a cognitive model of impaired TDMC in psychosis (Hutton *et al*., in prep.), as already outlined and depicted in **Figure 1**. Potential strategies for restoring TDMC were derived from the formulations. The formulations, along with the potential strategies for restoring TDMC, were shared with the clinical team if the patient participants agreed to this.

PM received regular supervision from PH, who has received in-depth training in CBT for psychosis as part of his role as trial therapist on clinical trials of CBT for psychosis (Morrison *et al*., 2012; Morrison *et al*., 2014; Morrison *et al.*, in prep). PH has published a practice guide

to collaboration in CBT for psychosis (Hutton & Morrison, 2013), and recently supervised several CBT therapists on a large multi-centre trial of CBT for clozapine-resistant psychosis (Pyle *et al*., 2016).

MacCAT-T (Grisso et al., 1997)

The MacCAT-T was used to assess decisional capacity for treatment in the patient participants. This is a semi-structured interview which takes about 40 minutes to administer.

PBEQ (Pyle et al., 2015)

The PBEQ was used to measure beliefs about psychotic experiences in patient participants. This is a brief self-report measure which typically takes less than 5 minutes to complete.

BCSS (Fowler et al., 2006)

The BCSS was used to assess schemata concerning self and others in patient participants. This is a brief self-report scale which typically takes less than 5 minutes to complete.

PANSS (Kay et al., 1987)

The PANSS was used to measure psychotic symptoms in the patient participants. This is a clinician-administered scale which typically takes between 30–40 minutes to administer. The intention was for this to be administered with the patient participants. An alternative option was to use this to assess patient participants' symptoms from case notes and speaking with clinicians.

BNA (Fervaha et al., 2015)

The BNA was used to measure cognitive functioning in the patient participants. It only takes up to 10 minutes to administer.

Beads Task (Garety et al., 1991; Phillips & Edwards, 1966)

A computerised version of the Beads Task was used to measure the "jumping to conclusions" (JTC) bias (a tendency to use fewer data to reach a decision) in the patient participants. It typically takes about 5 minutes to complete.

CBQp (Peters et al., 2014)

The CBQp was used to measure cognitive distortions in the patient participants. It is estimated to take no longer than 15 minutes to complete.

Abbreviated Version of the SUMD (Michel et al., 2013)

The abbreviated version of the SUMD was used to measure insight in the patient participants. This is a standardised expert-rating scale based on a patient interview and typically takes between 15–20 minutes to administer.

DASS-21 (Lovibond & Lovibond, 1995)

The DASS-21 was used to measure depression, anxiety and tension/stress in the patient participants. This is a brief 21-item self-report scale which typically takes about 5 minutes to complete.

RSES (Rosenberg, 1965)

The RSES was used to measure self-esteem in the patient participants. This is a brief self-report measure of overt global self-esteem which typically takes less than 5 minutes to complete.

PSWQ (Meyer et al., 1990)

The PSWQ was used to measure worry in the patient participants. This is a brief self-report inventory which typically takes less than 5 minutes to complete.

Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006)

The Brief Strengths Test was used to measure the strengths of the patient participants so that their strengths could be incorporated into the formulations where possible. This is a self-report measure which typically takes about 10 minutes to complete.

ASQpf (Lyon et al., 1994)

The ASQpf was used to measure patient participants' overt expression of attributional styles. The ASQpf typically takes about 20 minutes to complete.

Emotional Stroop Task

A computerised version of the Emotional Stroop Task using negative and neutral word stimuli from a previous study (Mitterschiffthaler *et al*., 2008) was developed for the purposes of the present study. This was used to measure covert self-esteem in the patient participants. The task typically takes about 5 minutes to complete.

YMRS (Young et al., 1978)

The YMRS was used to measure mania in the patient participants. This is a widely used clinician-administered scale which typically takes about 10 minutes to administer.

Supplementary Assessment

As we thought that it would be possible that not all patient participants would be able to fully adhere to the intervention protocol, we developed a simple method for ascertaining the unassessed variables from case notes and speaking with clinicians. The aim was that this information could then be used for the development of the formulations. In such cases, we took note of:

1. the degree to which a factor was present (not present/no evidence of presence, minor presence, moderate presence, marked presence);

2. whether a factor appeared to be associated with judgements of incapacity (no association, low association, moderate association, high association);
3. the strength of evidence for 1 (weak, moderate, high);
4. the strength of evidence for 2 (weak, moderate, high).

We also recorded the source of evidence supporting our rating. Moreover, irrespective of whether or not patient participants were able to fully adhere to the intervention protocol, we took note of any additional factors that were present and might be associated with incapacity but which we did not set out to investigate.

Table 1. Example of how the intervention might progress

Session number	Content of session
Session 1	• Rationale and purpose of session 1 – agenda setting. • Discussion regarding how the intervention might progress. Address the structured nature of the intervention including the structured assessments. Emphasise collaboration. • Understanding of their goals and reasons for attendance. Identification of their current problems in life and their goals related to these. • Discussion regarding the capacity issue. • Administer PBEQ and explore their responses. • Explanation of cognitive formulation. • Administer MacCAT-T. • Summary and feedback, link to next session. • Hometask – read formulation leaflet.
Session 2	• Rationale and purpose of session 2 – agenda setting. • Summary and feedback from session 1. • Summary of MacCAT-T results and their perspective. • Begin developmental assessment and formulation. • Administer BCSS and explore their responses. • Administer PANSS. • Summary and feedback, link to next session. • Hometask – timeline.
Session 3	• Rationale and purpose of session 3 – agenda setting. • Summary and feedback from session 2. • Build formulation – incorporate assessment of traumatic treatment experiences. • Administer the Beads Task and discussion of JTC bias if present. • Administer CBQp and explore their responses. • Administer the BNA. • Summary and feedback, link to next session. • Hometask – any outstanding self-report measures.
Session 4	• Rationale and purpose of session 4 – agenda setting. • Summary and feedback from session 3. • Continue building formulation – assess systemic factors. • Administer DASS-21, RSES and PSWQ. Then discussion of their responses. • Administer abbreviated version of SUMD. • Administer the Brief Strengths Test and discuss implications. • Summary and feedback, link to next session. • Hometask – any outstanding self-report measures.
Session 5	• Rationale and purpose of session 5 – agenda setting. • Summary and feedback from session 4. • Continue building formulation. • Administer ASQpf, Emotional Stroop Task and YMRS. Then discussion of their responses. • Summary and feedback, link to next session. • Hometask – any outstanding self-report measures.
Session 6	• Rationale and purpose of session 6 – agenda setting. • Summary and feedback from session 5. • Finish building formulation. • Discussion of intervention implications. • Seek consent to share formulation with clinical team. • Summary and feedback.

Abbreviations: ASQpf, Attributional Style Questionnaire parallel form; BCSS, Brief Core Schema Scale; BNA, Brief Neurocognitive Assessment; CBQp, Cognitive Biases Questionnaire for Psychosis; DASS-21, Depression Anxiety Stress Scale; MacCAT-T, MacArthur Competence Assessment Tool – Treatment; JTC, Jumping to Conclusions; PANSS, Positive and Negative Syndrome Scale; PBEQ, Positive Beliefs about Experience Questionnaire; RSES, Rosenberg Self-Esteem Scale; PSWQ, Penn State Worry Questionnaire; SUMD, Scale to assess Unawareness in Mental Disorder; YMRS, Young Mania Rating Scale.

Data Analysis

In accordance with guidelines for good practice for the analysis of pilot studies (Lancaster, Dodd, & Williamson, 2004), our analysis plan did not include the reporting of p values but instead focused on the reporting of simple descriptive statistics and effect sizes with their corresponding 95% confidence intervals (CIs). Effect sizes were calculated by computing Cohen's *d*, in which the difference between the means was divided by the pooled standard deviation (SD) (Cohen, 1988). Effect sizes are defined as small (0.2), medium (0.5) and large (0.8) (Cohen, 1988). These effect sizes were calculated using Exploratory Software for Confidence Intervals (ESCI; see Cumming & Finch, 2001). When there were more than 5 participants, corresponding 95% CIs were also calculated using ESCI. ESCI cannot calculate corresponding 95% CIs when there are 5 or less participants; thus, in these cases, effect sizes should be considered as preliminary.

The reasons for impaired TDMC given by patient and clinician participants on the measures of patient participants' reasons for incapacity (RIQ-P) and clinician participants' reasons for incapacity (RIQ-C), pre and post assessment and formulation, were rated by 2 independent experts (both of whom were qualified clinical psychologists, each with 10 years of experience in research and clinical practice in psychological interventions for psychosis) who were blind to the temporal order of the reasons supplied (i.e., whether they were gathered before or after the assessment and formulation process). They were asked to rate, using a simple 6-point Likert scale (from 1, which is "not at all rich", to 6, which is "extremely rich"), the extent to which they believe the list of reasons demonstrate a rich understanding of the factors that might impair TDMC. Inter-rater reliability was then explored by measuring the percent of agreement between the 2 expert raters (Lombard, Snyder-Duch, & Bracken, 2002). Agreement was defined as within one point on the Likert scale, and percent of agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. While one limitation of percent of agreement is its inability to account for chance agreement, this is more of a problem when there are just 2 categories in a coding scheme (e.g., rich vs not rich) (Lombard *et al.*, 2002). Nevertheless, given this risk, a higher threshold of 90% for percent of agreement has been suggested (Lombard *et al*., 2002). Thus, if percent of agreement was 90% or higher, we considered inter-rater reliability to be sufficient, which meant that the scores of the 2 expert raters could be averaged together and used in the subsequent analyses.

Moreover, individual scores on the structured assessments as part of the intervention were compared to relevant population norms for each patient participant. The process for selecting these norms is provided in the Appendix.

RESULTS

Participants

We received a total of 14 patient referrals across both sites – 11 in Site 1 and 3 in Site 2. In Site 1, 10 of the referred patients met our study criteria, of whom 5 (50%) agreed to participate and 5 (50%) refused to participate. The referred patient who was deemed unsuitable in Site 1 had a diagnosis other than a schizophrenia-spectrum disorder. All of the referred patients in Site 1 were inpatients in a low-secure forensic mental health ward and had initially been judged by the referring psychiatrist to have research participant capacity. The research participant capacity of those who agreed to participate was subsequently confirmed by the primary researcher. In Site 2, none (0%) of the 3 referred patients who met our study criteria agreed to participate. All of the referred patients in Site 2 were inpatients in the IPCU in a non-forensic mental health setting and had initially been judged by the referring psychiatrist to have research participant capacity. Among the 5 consenting patient participants, 4 (80%) were male and 1 (20%) was female. Their mean age was 41.6 with a SD of 8.6. **Table 2** shows a summary of the patient participants' characteristics. All diagnoses were made by the patient participants' psychiatrists as documented in the case notes. Because the risk of participants being identified in a case series is high, we decided not to report the specific sex of the individual patient participants. We also reported ranges regarding age and years since first diagnosis of the individual patient participants. However, we decided to report the ethnicity of the individual patient participants as all patient participants had the same ethnicity. Moreover, we presented the patient participants in a random order.

In regards to clinician participants, 13 clinicians involved in the care of the 5 patient participants in Site 1 agreed to participate, all of whom met our study criteria. Only one clinician (who also met our study criteria) did not respond to an invitation to participate. The 13 clinician participants provided 15 datasets in total, as 2 of the clinician participants were involved in the care of 2 of the patient participants. **Table 3** shows a summary of the clinician participants' characteristics in aggregate form.

Table 2. Summary of patient participants' characteristics (*n* = 5)

Participant	Age (range)	Ethnicity	Referral source	Diagnosis	Years since first diagnosis (range)	Antipsychotic medication
P1	22-31	Caucasian	Consultant psychiatrist	Schizoaffective disorder	0-1	Clozapine
P2	42-51	Caucasian	Consultant psychiatrist	Delusional disorder	Over 10	Clozapine
P3	42-51	Caucasian	Consultant psychiatrist	Delusional disorder	1-3	Clozapine
P4	32-41	Caucasian	Locum psychiatrist	Schizophrenia	0-1	Paliperidone
P5	32-41	Caucasian	Consultant psychiatrist	Schizophrenia	Over 10	Clozapine

Table 3. Summary of clinician participants' characteristics (*n* = 13)

Sex, *n* (%)	
Female	10 (76.9%)
Male	3 (23.1%)
Age, mean years (SD)	36.3 (10.2)
Ethnicity, *n* (%)	
Caucasian	11 (84.6%)
Asian	1 (7.7%)
Other	1 (7.7%)
Job title	
Consultant psychiatrist	2 (15.4%)
Locum psychiatrist	1 (7.7%)
Trainee psychiatrist	1 (7.7%)
Consultant clinical psychologist	1 (7.7%)
Clinical psychologist	1 (7.7%)
Occupational therapist	1 (7.7%)
Mental health nurse	4 (30.8%)
Trainee mental health nurse	2 (15.4%)
Length of work in health care, mean years (SD)	11.2 (9.6)
Length of work in psychosis, mean years (SD)	10 (9.7)

Case Reports

In the following section, the process and outcome of the intervention for each of the 5 patient participants are provided.

Participant 1

Referral

Participant 1 was referred by their psychiatrist because they were judged to lack the capacity to make a decision about hospitalisation. Reasons for such incapacity included being floridly psychotic but having limited insight into this and need for treatment as well as having limited ability to engage in meaningful discussion regarding treatment which was thought to be related to cognitive processing difficulties. Enjoying being manic and therefore not being motivated to be fully treated was another reason provided.

Process

Participant 1 was seen for 5 sessions lasting no longer than an hour each. The participant fully engaged in the process and completed all of the structured assessments. The PANSS had recently been administered as part of clinical work so it was decided that this did not need to be repeated. Two other assessments which were not part of the assessment battery, namely the Implicit Association Test (IAT; a measure of implicit self-esteem) (Greenwald & Farnham, 2000) and the Interpretations of Voices Inventory (IVI; a measure of interpretations of voices) (Morrison, Wells, & Nothard, 2002) had also recently been administered as part of clinical work so the results from these were incorporated into the formulation.

Background

As can be seen in **Table 2**, Participant 1 was aged between 22 and 31, was of Caucasian ethnicity, had received a diagnosis of schizoaffective disorder within the last year and was prescribed clozapine. The participant had a difficult upbringing. The participant's mother left the country shortly after their birth and had very little contact with the participant. This left the participant feeling neglected. The participant was reared by their father and step-mother. The participant felt treated differently by their step-mother in comparison to their step-siblings and as a result once again felt neglected. The participant also received some physical abuse by their father. The participant felt isolated growing up in a remote rural area. The participant had

moved schools a lot and got in trouble at times due to behavioural difficulties. The participant felt that they had not achieved their potential in school. The participant had smoked cannabis for several years, had participated in gambling and engaged in binge drinking at times. In more recent times, the participant had experienced stress including the death of a friend. The participant had also lost jobs as a result of stress. The participant had recently come into contact with mental health services due to a non-violent offence which was judged to be related to their psychotic symptoms.

Assessment Results

Participant 1's results from the set of structured assessments are provided in the Appendix. The MacCAT-T indicated that the participant had high scores across the different domains of understanding, appreciation, reasoning and expressing a choice (Grisso *et al*., 1997; Palmer, Dunn, Appelbaum, & Jeste, 2004). Therefore, it appeared that the participant's capacity had improved since the time of the referral (Session 1 took place approximately 3 weeks after the referral). This was consistent with the recent report of the referring psychiatrist. However, at the time of the referral, it was thought that the participant had difficulties with appreciation, especially the ability to appreciate that treatment could be beneficial. The evidence for this came from a brief initial appointment with the researcher just after referral as well as the psychiatrist's report. Therefore, we thought that it would be best to try to develop a formulation taking into consideration how the participant was at the time of the referral when they had difficulties with appreciation. Current difficulties were also taken into consideration as it was thought that these would put the participant at risk of being judged to lack capacity again.

The PANSS indicated that the participant only had positive symptoms of psychosis (Palmer *et al*., 2004). No negative symptoms were detected (Palmer *et al*., 2004). Notable scores from the PANSS include that the participant had severe delusions, primarily delusions of reference, and had severe hallucinatory behaviour – both auditory and visual. The BCSS indicated that the participant had higher than normal explicit positive beliefs about self (Fowler *et al*., 2006). Interestingly, the Emotional Stroop Task as well as the IAT indicated that the participant had lower than normal implicit beliefs about self (Besnier *et al*., 2011)**.** The ASQpf, YMRS and BNA indicated that the participant had an attributional style similar to depressed patients (Lyon *et al*., 1994), had higher than normal symptoms of mania (Berk *et al*., 2008) and had low average global neurocognitive ability (Fervaha *et al*., 2015). The IVI indicated that the participant's appraisals of voices had a protective function [e.g., "If I were to hear sounds or

voices that other people could not hear, I would probably think that: they allow me to help others (believes very much); they mean that I am close to God (believes moderately so)]. Other information was derived from the cognitive-behavioural interview including metacognitive beliefs/awareness.

Formulation

A full formulation incorporating the results from the structured assessments and cognitive-behavioural interview regarding Participant 1 can be seen in **Figure 2**. The participant's life experiences were characterised by, among others, abandonment, neglect, physical abuse, social isolation, substance misuse, academic underachievement and job losses. These experiences seem to have contributed to long-standing low self-esteem, including beliefs of being unlovable, a failure and a sense of not belonging. Although these beliefs were sometimes explicit, they often appeared to be implicit. The participant's key appraisals appeared to be in conflict with each other. On an explicit level, the participant appraised their intrusive thoughts/voices and things appearing significant (e.g., receiving a non-verbal message from a footballer through the TV) as meaning that they were important, had special powers and were close to God. These explicit appraisals appeared to be protective against the effects of low implicit self-esteem. On an implicit level, the participant appeared to appraise their life experiences as meaning that they were unlovable, a failure and that they did not belong in society. The participant's appraisals – both explicit and implicit – appeared to be influenced by their cognitive resources. Indeed, the participant's low average cognitive functioning and depressive attributional style (where they tended to attribute negative events to themselves) appeared to contribute to their implicit appraisals. On the other hand, the participant's tendency to over-analyse and their confirmation bias (where they tended to look for evidence consistent with their explicit beliefs) appeared to contribute to their explicit appraisals. Moderating the negative effect of the participant's cognitive resources was likely to be metacognitive awareness of these resources. For example, the participant's unawareness of their confirmation bias made it less likely that they took steps to mitigate the effects of this confirmation bias. Metacognitive beliefs and awareness also appeared to directly affect the participant's appraisals. For example, the participant's belief that the mind is capable of great things and has special powers made it more likely than when the participant experienced intrusive thoughts/voices they interpreted these as meaning that they were special. Regarding emotion, the participant's appraisals appeared to lead to very high emotional arousal including depression and mania. In regards to capacity, the participant's appraisals appeared to negatively

affect their capacity, specifically their ability to appreciate that treatment could be beneficial. Indeed, the participant's explicit appraisals that they were important, had special powers and were close to God may have meant to the participant that they were not ill and therefore did not need treatment. The participant's emotional arousal especially mania also had an impact on ratings of appreciation.

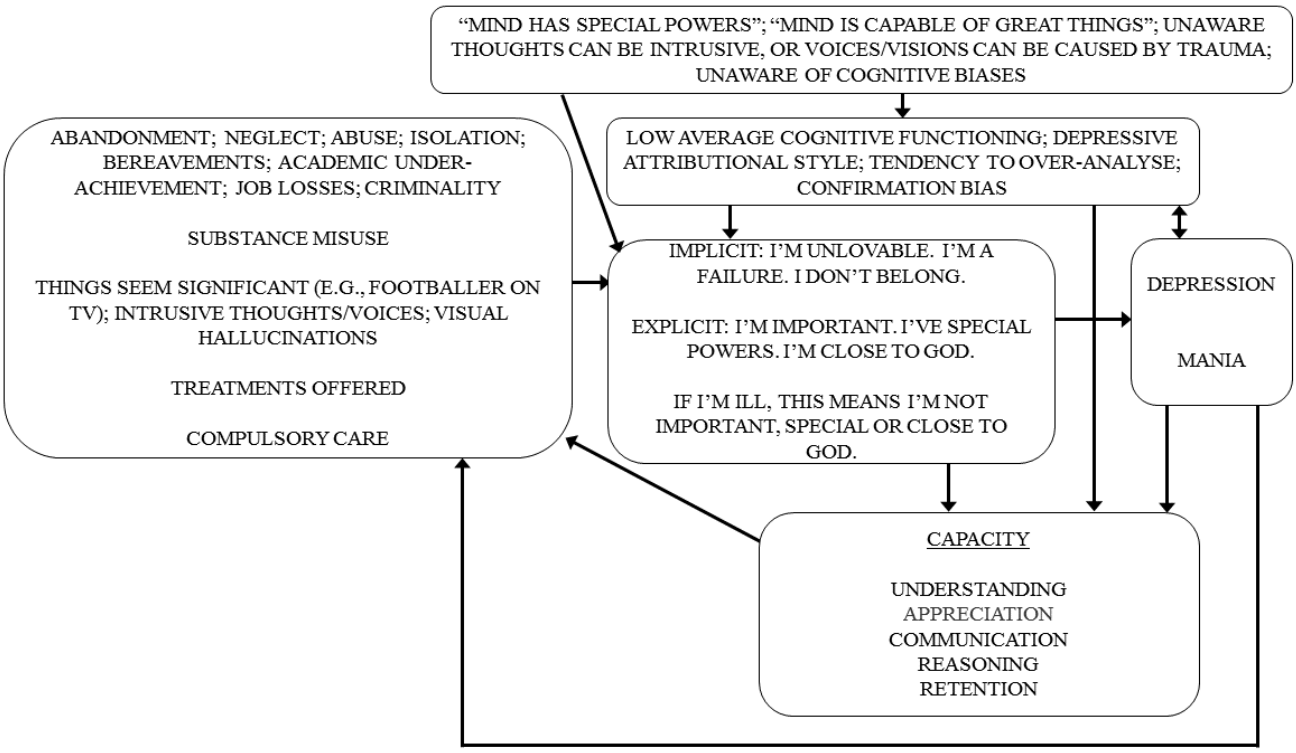


Figure 2. Case formulation for Participant 1

Further Intervention Implications

In terms of supporting capacity and autonomy, we made the following recommendations to clinician participants involved in the care of Participant 1:

- Improve the self-esteem of the participant, help them make sense of the past and modify their depressive attributional style, as these interventions may reduce their need to have special powers, thereby increasing their ability to appreciate treatment-relevant information.

- Do not ‘normalise’ experiences, promote ‘insight’ into symptoms, or modify confirmation bias before self-esteem is improved, as reducing the participant’s sense of specialness at this stage may risk inducing depression.
- Once self-esteem and relationships with others are sufficiently strong, psychoeducation about trauma-intrusions and trauma-psychosis literature, longitudinal formulation and modification of confirmation bias may help the participant develop alternative explanations for their experiences, thus improving appreciation further.

Outcomes and Feedback

At the end of the intervention, Participant 1 reported enjoying the process. The participant liked the computer tasks (including the Emotional Stroop Task and the Beads Task) and discussing the interpretation of these. Outcomes regarding feasibility, acceptability, utility/efficacy and safety were positive (see **Table 4**). Regarding feasibility, the WAI indicated that the participant had very positive perceptions of alliance or collaboration during the sessions. In regards to acceptability, the AQ indicated that the participant found the intervention very acceptable. As for utility/efficacy, the pre- and post-RIQ-P scores, which had been blindly rated by 2 independent experts, indicated that the participant provided a richer understanding of the factors that may impair their TDMC at post-intervention in comparison to baseline. Reasons for impaired TDMC provided at post-intervention that were not present at baseline include: “My experiences might have affected my thinking” and “My capacity might have been affected by the way I was thinking about things”. The IKI-P and IKI-R, both of which were administered at baseline and post-intervention, also indicated that the participant had become more knowledgeable of the factors that may impair their TDMC. Finally, with regard to safety, the CDSS, CGI-R and CGI-P, all of which were administered at baseline and post-intervention, indicated that the participant’s mental health difficulties including any depressive symptoms had not worsened over the course of the intervention. The post-intervention AEQ also indicated no adverse effects from intervention involvement.

Participant 2

Referral

Participant 2 was referred by their psychiatrist. As the message of the referral was passed through another clinician, the researcher was not clear at the outset regarding the specific

reasons of the referral other than that the participant was presumed or judged to lack TDMC. Subsequently, the researcher was informed that the participant had previously been judged to have the capacity to make a decision about anti-psychotic medication but that perhaps the participant's capacity to make other treatment decisions was in question. As the participant had unsuccessful periods living in supportive accommodation in the community, whether the participant had the capacity to make a decision about hospitalisation vs supportive accommodation was explored. Another problem that was identified by the clinical team was that the participant frequently asks for excessive quantities of his current medications and for additional medications and other treatment (e.g., Valium, electroconvulsive therapy; ECT) for indications that are not appropriate. This problem was taken into consideration but it was not the specific focus of the formulation.

Process

Approximately 10 minutes into the first session, Participant 2 asked whether the session could end early following which they left the room. Reflecting on the process of the session, the researcher believed that perhaps the participant had felt somewhat defensive about discussing the reason for the referral – i.e., that the participant had been presumed to lack TDMC by the referring psychiatrist. The researcher also reflected that perhaps the participant had found the task of completing one of the questionnaires (PBEQ) too taxing due to cognitive functioning difficulties. A couple of days later, the participant requested whether another session could be arranged. During this second session, the researcher provided sufficient space for the participant to 'tell their story' both as a way of engagement and to acquire information that would contribute to the formulation. The researcher also advised the participant that he was not taking a position on whether the participant lacked TDMC or had a need for care. Rather, the researcher emphasised that his role was instead to work with the participant to understand why a judgement regarding impaired TDMC had been made and to identify what could be done to achieve a judgement of regained TDMC. The participant seemed to enjoy the second session and engaged well throughout the session. On discussion between the researcher and participant, the participant decided that they would like to have shorter but more frequent sessions. In total, the participant attended 10 sessions averaging about 30 minutes each. An agenda was established at the start of each session, where the researcher and participant agreed that they could complete some structured assessments as well as spend time talking about the general interests of the participant (e.g., bible, guitar). The participant completed the majority of the structured assessments throughout the sessions.

Background

As can be seen in **Table 2**, Participant 2 was aged between 42 and 51, was of Caucasian ethnicity, had received a diagnosis of delusional disorder over 10 years ago and was prescribed clozapine. The participant had grown up in a stressful home environment. The participant's mother experienced anxiety and both their mother and father had an alcohol problem and fought at times (e.g., the participant had a memory of their mother scalding their father with boiling water). The participant themselves also experienced anxiety, which affected their school performance and achievement and relationships with others. In addition, the participant used to abuse their mother's prescription medication and had a pattern of substance misuse since then. The participant's psychosis emerged in their late teens which resulted in an admission to hospital. The participant believed that their psychosis had a significant impact early in its development including leading to job losses and self-harm attempts. The participant continued to feel guilty about different events and the effect of their psychosis on their parents. The participant made sense of many of their life experiences from a religious perspective (e.g., the participant believed that many adverse events in their life were due to the Devil taking over their soul). The participant had unsuccessful attempts living in supportive accommodation due to violent/sexualised behaviour, which was often associated with substance misuse especially alcohol misuse. The participant had been hospitalised for several years in a row at the time of the referral.

Assessment Results

Participant 2's results from the set of structured assessments are provided in the Appendix. The MacCAT-T indicated that the participant had difficulties in relation to their capacity to decide between hospitalisation and supportive accommodation. Specifically, some of the participant's scores in relation to understanding, appreciation and reasoning were problematic (Grisso *et al*., 1997; Palmer *et al*., 2004). With regard to understanding, the participant did not appear to fully understand the risks of supportive accommodation (i.e., they underestimated the likelihood that risks such as substance misuse – which had been associated with their previous disinhibited behaviour – would be experienced). Regarding appreciation, the participant did not appear to fully appreciate the possibility that hospitalisation could have certain benefits over supportive accommodation. In regards to reasoning, the participant appeared to have difficulties translating the risks of supportive accommodation into practical, everyday consequences (e.g., effect on recreational or interpersonal relations).

The PANSS indicated that the participant had primarily positive rather than negative symptoms of psychosis (Palmer *et al*., 2004). Notable scores from the PANSS include that the participant had severe delusions, primarily religious and persecutory delusions, and had moderate severe auditory hallucinatory behaviour. The PANSS also indicated that the participant had severe guilt feelings. The BCSS indicated that the participant had higher than normal negative beliefs about self (Fowler *et al*., 2006). Interestingly, the participant reported that praying and their relationship with God could combat these negative beliefs. The PSWQ and DASS-21 indicated that the participant had higher than normal worry and anxiety (Crawford & Henry, 2003; Fresco, Mennin, Heimberg, & Turk, 2003; Gillis, Haaga, & Ford, 1995; Henry & Crawford, 2005). The Beads Task and the JTC subscale of the CBQp indicated that the participant made decisions on the basis of less evidence compared to normal controls (Dudley *et al*., 2016; Peters *et al*., 2014). The ASQpf indicated that the participant had a greater than normal tendency to attribute negative events to external causes (Lyon *et al*., 1994). The BNA indicated that the participant had lower than normal global neurocognitive ability; in fact, the participant was over 2 SDs below normative data (Fervaha *et al*., 2015). Other information was derived from the cognitive-behavioural interview including that the participant identified with the risk-taking culture of Rock n' Roll and that they had capacity relevant appraisals and metacognitive beliefs/awareness.

Formulation

A full formulation incorporating the results from the structured assessments and cognitive-behavioural interview regarding Participant 2 can be seen in **Figure 3**. The participant's life experiences were characterised by, among others, a stressful home environment, academic underachievement, loneliness (due to difficulties sustaining friendships with peers), job losses and substance misuse. These experiences seem to have contributed to long-standing low self-esteem, including beliefs of being unlovable, unworthy, a failure and an "absolute moron". The participant's religious beliefs appeared to help them cope with such low self-esteem. Indeed, they helped the participant make sense of the world and made the participant feel valued and loved. Although very important to the participant, the participant's religious beliefs also shaped their appraisals. On an explicit level, the participant appraised their intrusive thoughts/voices as meaning that they had a special relationship with Jesus and that Jesus would keep them on the right path, without needing to think carefully about decisions. This may have been a more appealing appraisal to the participant than an alternative, perhaps largely implicit appraisal that the participant was responsible for their own decisions. The participant's appraisals appeared

to be influenced by their cognitive resources. For example, the participant's externalising attributional bias (where they tend to attribute negative events to others) appeared to contribute to their appraisal that Jesus is responsible for their decisions. Moderating the negative effect of the participant's cognitive resources was likely to be metacognitive awareness of these resources. For example, the participant's unawareness of their externalising attributional bias and JTC bias made it less likely that they took steps to mitigate the effects of these biases. Metacognitive beliefs also appeared to have an impact. For example, the participant's belief that "It's good to make decisions based on gut instinct" may have influenced why the participant formed conclusions quickly. Regarding emotion, the participant's appraisals appeared to lead to very high emotional arousal ranging from joy to guilt, anxiety and sadness. In regards to capacity, the participant's appraisals, cognitive resources (moderated by metacognitive awareness/beliefs) and emotional arousal all appeared to affect their capacity. Of note, the participant's belief that Jesus would help them choose, together with their positive beliefs about making decisions quickly, all made it more likely that they would jump to conclusions quickly, but hold other people or entities (e.g., Jesus, the Antichrist) responsible for the decisions they made. Indeed, these factors would have had an impact on the participant's abilities to understand, appreciate and reason, as outlined above. Of course, the participant's poor cognitive functioning could also have had a direct impact on understanding and reasoning.

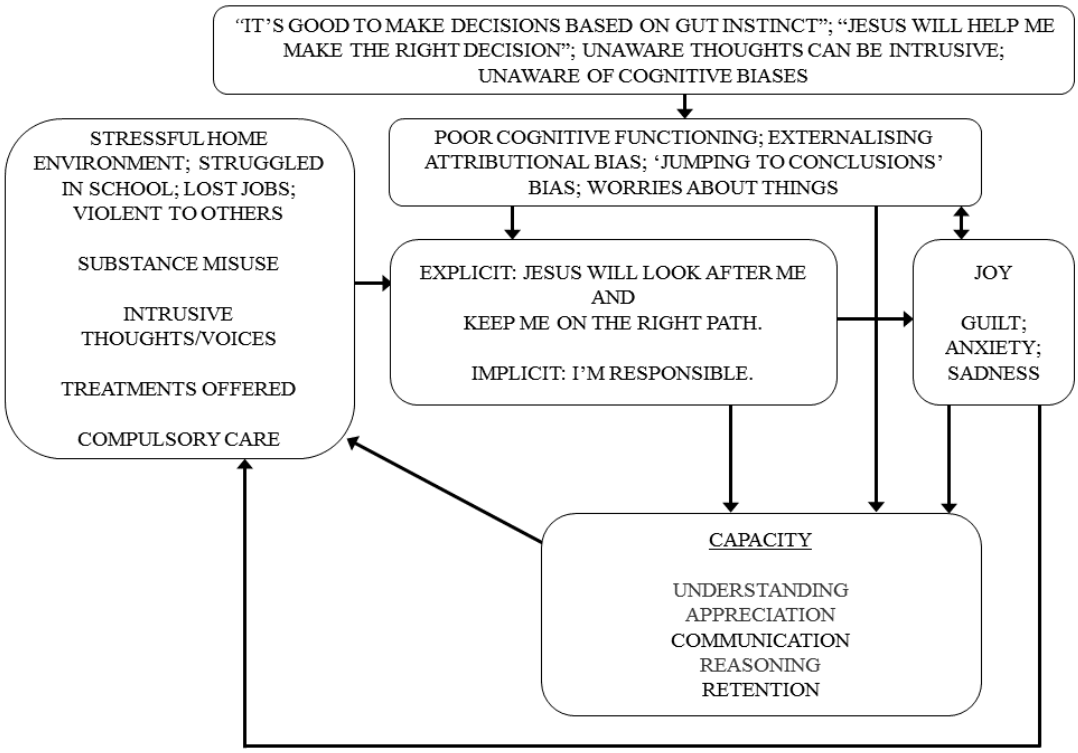


Figure 3. Case formulation for Participant 2

Further Intervention Implications

In terms of supporting capacity and autonomy, we made the following recommendations to clinician participants involved in the care of Participant 2:

- Support from someone with expertise in religion might be useful at an early stage, if this helps the participant realise that they still have responsibility for decisions, and that careful decision-making is encouraged by religious leaders.
- The participant's capacity may also benefit from an intervention that effectively improves their self-esteem. This may reduce the degree to which they are reliant on their religious beliefs, thus improving their ability to consider whether they have a need for care.
- The participant may also benefit from individualised metacognitive training, as this addresses two of the capacity-relevant cognitive biases the participant demonstrates. The participant's minimisation of risks may require an idiosyncratic intervention.
- A brief intervention to reduce worry may help to reduce the participant's anxiety, guilt and sadness, and improve their cognitive functioning.

- Cognitive remediation may also help improve the participant's cognitive functioning and help them to develop strategies to overcome the difficulties they have.

Outcomes and Feedback

At the end of the intervention, when the researcher and Participant 2 reflected on the positive and any negatives of the process, Participant 2 reported that they found the process "comforting" as they had the opportunity to talk about their problems and get things off their chest. The participant said that on rare occasions they felt somewhat paranoid but that this paranoia did not relate to the researcher and just reflected the paranoia that the participant tended to experience (e.g., every couple of days, the participant tended to be distressed by the belief that people in the city were thinking about them negatively). Outcomes regarding feasibility, acceptability, utility/efficacy and safety were positive (see **Table 4**). Regarding feasibility, the WAI indicated that the participant had very positive perceptions of alliance or collaboration during the sessions. In regards to acceptability, the AQ indicated that the participant found the intervention very acceptable. As for utility/efficacy, the pre- and post-RIQ-P scores, which had been blindly rated by 2 independent experts, indicated that the participant provided a richer understanding of the factors that may impair their TDMC at post-intervention in comparison to baseline. At baseline, the participant had not been able to provide any reasons, but at post-intervention, the participant's reasons included: "Making decisions based on a gut feeling and my paranoia might affect my decision-making". The IKI-R, which was administered at baseline and post-intervention, indicated that the researcher believed that the participant had become more knowledgeable of the factors that may impair their TDMC. The participant's own impression of their knowledge of the factors that may impair their TDMC had remained the same, as indicated by their baseline and post-intervention IKI-P scores. Indeed, the participant rated their knowledge regarding such as "very knowledgeable" at both baseline and post-intervention. However, the participant's high rating at baseline was not surprising given the initial defensiveness of the participant as reflected in the process section above. Finally, with regard to safety, the CDSS, CGI-R and CGI-P, all of which were administered at baseline and post-intervention, indicated that the participant's mental health difficulties including any depressive symptoms had not worsened over the course of the intervention. The post-intervention AEQ also indicated no adverse effects from intervention involvement.

Participant 3

Referral

Participant 3 was referred by their psychiatrist because they were judged to lack the capacity to make a decision about anti-psychotic medication. Factors contributing to such incapacity included having limited insight into past or ongoing mental health difficulties and need for treatment. A sealing-over recovery style was also indicated.

Process

Participant 3 was seen for just 2 sessions lasting no longer than an hour each. The participant completed the structured assessments of these sessions as per protocol but subsequently disengaged. Reflecting on the process, the researcher believed that he had focused too soon on topics that were emotionally salient or potentially upsetting for the participant. In particular, when attempting to gather a developmental history as part of the cognitive-behavioural interview, the participant demonstrated a reluctance to talk about the past. Rather than talking explicitly about the past, the researcher suggested that perhaps they could reflect on the advantages and disadvantages of talking about the past. At this point, the participant said that they would rather not continue with the intervention as they did not think that it would be beneficial. However, the participant agreed that the researcher could still continue with the process without the involvement of the participant. This included reviewing case notes, speaking with clinicians and sharing the resulting formulation with the clinical team.

Background

As can be seen in **Table 2**, Participant 3 was aged between 42 and 51, was of Caucasian ethnicity, had received a diagnosis of delusional disorder within the last 3 years and was prescribed clozapine. The participant had a difficult upbringing. The participant's mother left the country within the first few years of their birth and had little or no contact with them throughout the rest of their childhood. This likely left the participant feeling neglected. The participant was also subject to physical and emotional abuse by their step-mother afterwards. The participant started exhibiting behavioural difficulties in school and had difficulties forming peer relationships. Because of these difficulties, the participant spent some time in secure schooling. The participant was eventually excluded from their family home in their late teens. The participant ended up having a few children with their current partner. Over 10 years ago, the participant experienced bereavement due to the death of their father. The participant then

became increasingly withdrawn and socially isolated. The participant also engaged in drug and alcohol misuse. In more recent times, the participant got involved in online gaming and experienced some bullying/harassment in this context. The participant subsequently developed persecutory delusions related to online gaming activity. The participant also developed other types of delusions including delusions of jealousy and reference. Delusions of jealously were reported to be related to the participant's index offence which consisted of an assault on their partner. The participant had been an inpatient for a few years at the time of the referral.

Assessment Results

Participant 3's results from the structured assessments (MacCAT-T, PANSS, PBEQ and BCSS) are provided in the Appendix. The MacCAT-T indicated that the participant had an impairment in appreciation, in that the participant was judged to lack the ability to appreciate the significance of the treatment-related information, including that they had a disorder and that anti-psychotic medication could be beneficial (Grisso *et al*., 1997; Palmer *et al*., 2004). The main result from the PANSS was, unsurprisingly, that the participant had severe lack of insight; indeed, the participant denied ever having had a psychiatric disorder or being delusional. The PANSS indicated that the participant did not have any significant current positive symptoms of psychosis, which was corroborated by the clinical team (Palmer *et al*., 2004). The participant's negative symptoms' score on the PANSS was relatively low, although the participant received moderate scores for blunted affect, emotional withdrawal and poor rapport (Palmer *et al*., 2004). The supplementary assessment (as described in the Intervention section in the Method) indicated that the participant had marked belief inflexibility as well as moderate externalising attributional bias, confirmation bias and JTC bias. Other information was derived from the cognitive-behavioural interview of the first 2 sessions including the participant's views regarding the judgement of impaired TDMC and events that led to their index offence (e.g., "They are just trying to do their job but have got it wrong", "They are making a mountain out of a molehill", "I was drunk and things happened").

Formulation

A full formulation incorporating the results from the assessments regarding Participant 3 can be seen in **Figure 4**. The participant's life experiences were characterised by, among others, abandonment, neglect, physical and emotional abuse, exclusion, bereavements and substance misuse; these external experiences likely led to the participant's previous psychotic symptoms especially delusions. The participant's key appraisals appeared to be in conflict with each other.

On a perhaps implicit level, the participant appeared to appraise their experiences – both external experiences and internal experiences (i.e., previous intrusive thoughts) – as meaning that thinking about the past would lead to their thoughts becoming uncontrollable and that their illness was related to a sense of shame. To protect theirself, the participant adopted explicit appraisals, specifically that their clinical team were wrong in diagnosing mental illness and that thinking about the past would not enable them to progress. The participant's appraisals appeared to be influenced by their cognitive resources. For example, the participant's belief inflexibility meant that the participant was unlikely to change their appraisals in light of reflection and evidence. Moderating the negative effect of the participant's cognitive resources was likely to be metacognitive awareness/beliefs of these resources. For example, the participant's unawareness of their cognitive biases made it less likely that they took steps to mitigate the effects of these biases. The participant's cognitive resources not only appeared to influence the participant's appraisals but they also appeared to have a direct effect on capacity. For example, the participant's confirmation bias meant that they sought evidence consistent with their belief that they were not ill and likely discounted evidence inconsistent with this belief, thereby affecting appreciation. Of course, the participant's appraisals also would have had a direct effect on appreciation. Regarding emotion, the participant's appraisals appeared to lead to high emotional arousal – ranging from irritation, frustration, defeatedness and numbness to fear and shame. Fear and shame in particular may have made it difficult for the participant to accept that they had developed a need for care, which may have affected their appreciation.

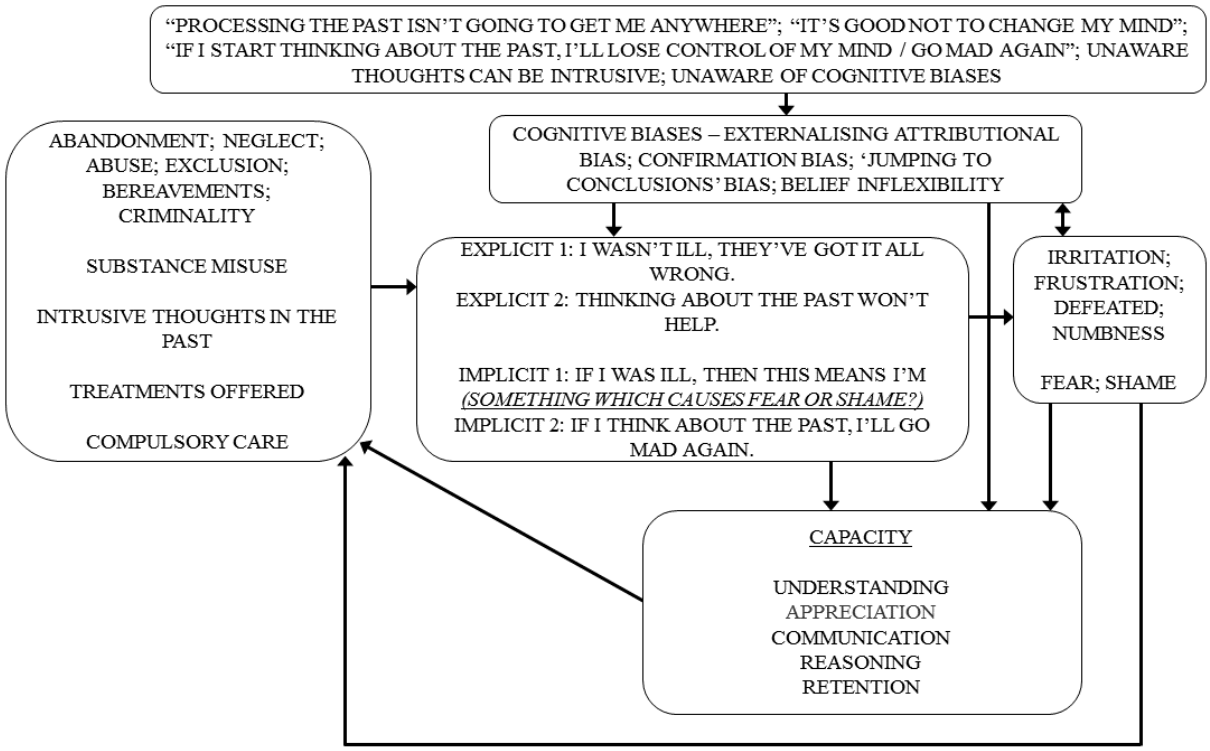


Figure 4. Case formulation for Participant 3

Further Intervention Implications

In terms of supporting capacity and autonomy, we made the following recommendations to clinician participants involved in the care of Participant 3:

- The participant is understandably very reluctant to talk about the past directly, but this may maintain their incapacity and increase their risk of relapse. The participant may be worried that if they open the floodgates they may not be able to close them again.
- If the participant fears that talking and thinking about the past will cause them to lose control and go mad again, then three approaches may help: (1) Emotion regulation training may help the participant in their relationships with others. It is designed to show people how they can regulate their emotions. This may help prepare the participant for the intense emotion they may feel if they talk about the past. It may also help them in their interactions with other people. (2) Metacognitive therapy (not the same as metacognitive training) may help the participant, as this is explicitly designed to show people how they have control over their thoughts. (3) An intervention to

identify and address any internalised stigma the participant has about their diagnosis and treatment may be useful to tackle any feelings of shame they may have. This should validate and normalise any feelings of shame, and encourage self-compassion.

- Importantly, none of these 3 interventions will require the participant to talk about their past explicitly, or challenge their specific appraisals/ beliefs.
- If these interventions help the participant improve their sense of control over their thoughts and feelings, and reduce their feelings of shame, then further interventions focused on identifying and challenging their positive beliefs about hasty decision-making and improving their ability to reflect and modify their beliefs may be useful.
- All of this needs to be done within the context of a long-term secure relationship where the participant has control over what does and does not happen.
- At some point, the participant may then be able to engage in the trauma reprocessing work, which may be essential to allow them to integrate and make sense of their experiences.

Outcomes and Feedback

As described in the Process section above, Participant 3 disengaged after the first 2 sessions due to their reluctance to talk about the past and their belief that the intervention would not be beneficial. The participant agreed to complete the AEQ at post-intervention. The participant scored only 9 out of 108 on the AEQ and inspection of their individual responses did not indicate any concerning adverse effects from intervention involvement. Although broaching the past was perceived by the researcher to have been the trigger for disengagement, the participant rated only "very little" to "Taking part made me think too much about bad things that have happened in the past". The AEQ did not indicate that the participant had any worsening difficulties, increased stigma or conflict with others as a result of the intervention. Unsurprisingly, the AEQ did indicate some difficulties with engagement (i.e., the participant rated "a little" to "Taking part took up too much of my time", "Taking part required too much energy or motivation" and "Taking part involved too much hard work"). It is also worth noting that the participant rated "very much" to "My problems have improved to the point whereby I no longer feel I need help".

Participant 4

Referral

Participant 4 was referred by their psychiatrist because they were judged to lack the capacity to make a decision about anti-psychotic medication. Factors contributing to such incapacity included having impaired mental state (i.e., acute psychosis), impaired understanding of mental illness and effects of illicit drugs and alcohol, low intelligence and cultural factors.

Process

Participant 4 was seen for 5 sessions lasting no longer than an hour each. The participant fully engaged in the process and completed all of the structured assessments. Initially, the participant showed a lack of spontaneity and openness to the researcher's more open-ended questions related to the cognitive-behavioural interview. While this pattern of responding may have been related to the participant's psychosis, the participant's flow of conversation became more fluid as the sessions progressed. Throughout all of the sessions, however, the participant showed a particular interest in completing the structured assessments, learning what they assess and discussing what their pattern of results might mean.

Background

As can be seen in **Table 2**, Participant 4 was aged between 32 and 41, was of Caucasian ethnicity, had received a diagnosis of schizophrenia within the last year and was prescribed paliperidone. While currently abstinent, the participant had a long history of substance misuse including intravenous heroin use and was receiving methadone treatment. The participant had a particularly difficult upbringing. The participant was placed in foster care shortly after their birth and spent many of their earlier years in and out of foster care. The participant recalled a particularly stressful memory from their childhood when they discovered that their step-mother was not their biological mother and their biological mother had in fact been hospitalised due to a diagnosis of schizophrenia. The participant's behavioural difficulties escalated thereafter. At another stage in the participant's childhood, their father was convicted of sexually abusing their sisters. This precipitated the participant's initiation into substance misuse and antisocial behaviour. Shortly afterwards, the participant also reported being sexually abused while in a children's home. The participant had several children, all of whom were from previous relationships, and up until recently did not have contact with any of them at their mother's requests. More recently, the participant had been living homeless with their partner. The

participant was subsequently imprisoned due to assaulting their partner, which appeared to be related to delusions of jealousy. An exacerbation of the participant's psychotic symptoms was reported while the participant was in prison. Shortly afterwards, the participant was admitted to hospital. The participant continued to have a relationship with their partner while in hospital, although their partner had recently been incarcerated.

Assessment Results

Participant 4's results from the set of structured assessments are provided in the Appendix. The MacCAT-T indicated that the participant had high scores across the different domains of understanding, appreciation, reasoning and expressing a choice (Grisso *et al*., 1997; Palmer *et al*., 2004). Therefore, similar to Participant 1, it appeared that the participant's capacity had improved since the time of the referral (Session 1 took place approximately 4 weeks after the referral). This was consistent with the recent report of the referring psychiatrist. However, at the time of the referral or shortly beforehand, it was thought that the participant had difficulties across the MacCAT-T domains of understanding, reasoning and appreciation. Retention difficulties, also related to impaired TDMC, were thought to be present as well. The evidence for these difficulties came from review of case notes as well as speaking to clinicians involved in the care of the participant. Therefore, we thought that it would be best to try to develop a formulation taking into consideration how the participant was at the time of the referral when they had difficulties with understanding, appreciation, reasoning and retention. Current difficulties were also taken into consideration as it was thought that these would put the participant at risk of being judged to lack capacity again.

Administration of the PANSS with the participant indicated that the participant currently had negative rather than positive symptoms of psychosis, including blunted affect (severe), passive/apathetic social withdrawal (severe) and lack of spontaneity and flow of conversation (moderate severe) (Palmer *et al*., 2004). In relation to the general psychopathology subscale of the PANSS, the participant scored extreme for tension. This was manifested by extreme restlessness (i.e., unable to remain seated for long, pacing). However, retrospectively the participant reported that they had experienced positive symptoms of psychosis some weeks back. These included delusions of control and persecution as well as auditory hallucinatory behaviour, all of which were judged to have been severe. In regards to current deficits, the PBEQ indicated that the participant had higher than normal external shame about illness (e.g., the participant agreed with "I am embarrassed to talk about my experiences") (Morrison *et al.*,

2015). The ASQpf indicated that the participant had a strong tendency to attribute negative events to external causes (Lyon *et al*., 2015). The BNA indicated that the participant had lower than normal global neurocognitive ability, particularly in the area of working memory, where the participant was over 2 SDs below normative data (Fervaha *et al*., 2015). Other information was derived from the cognitive-behavioural interview including metacognitive beliefs/awareness.

Formulation

A full formulation incorporating the results from the structured assessments and cognitive-behavioural interview regarding Participant 4 can be seen in **Figure 5**. The participant had a lot of bad things happen to them when they were a child, and their freedom had been greatly restricted. These may have felt outside of the participant's control, and the participant may have learned that they are at the mercy of events. The participant had also experienced a lot of exclusion, abandonment and abuse. These and other external experiences (e.g., substance misuse) as well as the participant's internal experiences (i.e., intrusive thoughts/voices) appear to have shaped the participant's explicit appraisals, specifically that their thoughts were being controlled by someone else and their partner would leave them for someone else. Both of these explicit appraisals appeared to mean to the participant that they were not ill. Indeed, they appeared to be protective against alternative, perhaps largely implicit appraisals related to self-stigma and guilt about the things the participant had done. Self-stigma in particular may have been influenced by the participant's discovery that their mother had schizophrenia when they were a child. The participant's appraisals appeared to be influenced by their cognitive resources. For example, the participant's externalising attributional bias may have contributed to their belief that their mind was being controlled. Moderating the negative effect of the participant's cognitive resources was likely to be metacognitive awareness/beliefs of these resources. For example, the participant's unawareness of their externalising attributional bias made it less likely that they took steps to mitigate the effects of this bias. The participant's cognitive resources not only appeared to influence the participant's appraisals but they also appeared to have a direct effect on capacity. For example, the participant's low working memory capacity likely affected the degree to which they could understand, reason with and remember treatment-relevant information. Of course, the participant's appraisals also would have had a direct effect on capacity including appreciation. Regarding emotion, the participant's appraisals appeared to lead to very high emotional arousal – ranging from fear and jealousy to guilt and shame. Shame in particular may have made it difficult for the

participant to accept that they had developed a need for care, which may have affected their appreciation.

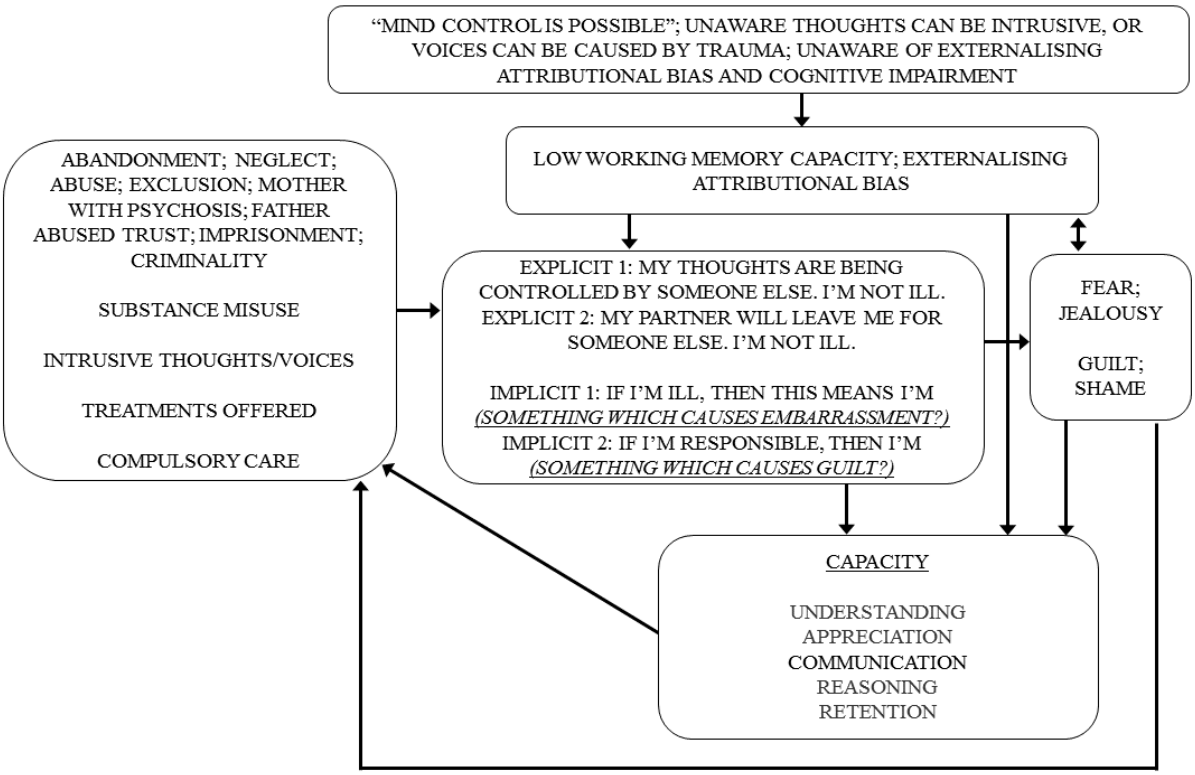


Figure 5. Case formulation for Participant 4

Further Intervention Implications

In terms of supporting capacity and autonomy, we made the following recommendations to clinician participants involved in the care of Participant 4:

- Cognitive remediation may help improve the working memory of the participant and help them to develop strategies to overcome the difficulties they have. This could increase their cognitive reserve and reduce the risk of them not being able to understand, remember or reason about treatment-related information.
- Identifying and addressing any internalised stigma may help the participant communicate about their experiences more, and may make it easier for them to consider they have a need for care.

- Improving their metacognitive awareness of how social defeat, trauma and substance use can cause intrusive thoughts, voices and paranoia may help increase the participant's ability to consider they have a need for care.
- Addressing the participant's externalising attributional bias (e.g., through metacognitive training) may reduce the risk of their paranoia and jealousy returning, and may improve their ability to appreciate, understand and reason with treatment-relevant information. However, it may also cause trigger guilt and remorse, and may be very difficult to do.

Outcomes and Feedback

At the end of the intervention, Participant 4 reported enjoying the process. The participant also said that completing the computer tasks and discussing the interpretation of these were "fun". If anything, the participant said that they would have liked to have completed more of these. Outcomes regarding feasibility, acceptability, utility/efficacy and safety were positive (see **Table 4**). Regarding feasibility, the WAI indicated that the participant had very positive perceptions of alliance or collaboration during the sessions. In regards to acceptability, the AQ indicated that the participant found the intervention very acceptable. As for utility/efficacy, the pre- and post-RIQ-P scores, which had been blindly rated by 2 independent experts, indicated that the participant provided a richer understanding of the factors that may impair their TDMC at post-intervention in comparison to baseline. Reasons for impaired TDMC provided at post-intervention were: "I didn't have knowledge about my illness – I didn't understand that people weren't controlling my thoughts and that I was ill" and "Feeling shame and fearing my illness – I thought that other people would laugh at me if they thought I had an illness". These reasons were clearly richer – and more insightful – than "untreated schizophrenia", which is the reason that the participant provided at baseline. Encouragingly, although the participant's PBEQ score during session 1 indicated that they had higher than normal external shame about illness, the participant said the following during the post-intervention assessment: "I no longer feel shame because I've met other people who have it – who are going through the same thing". The IKI-R, which was administered at baseline and post-intervention, indicated that the researcher believed that the participant had become more knowledgeable of the factors that may impair their TDMC. The participant's own impression of their knowledge of the factors that may impair their TDMC had remained the same, as indicated by their baseline and post-intervention IKI-P scores. Indeed, the participant rated their knowledge regarding such as "extremely knowledgeable" at both baseline and post-intervention. Finally, with regard to safety, the

CDSS, CGI-R and CGI-P, all of which were administered at baseline and post-intervention, indicated that the participant's mental health difficulties including any depressive symptoms had not worsened over the course of the intervention. The post-intervention AEQ also indicated no adverse effects from intervention involvement.

Participant 5

Referral

Participant 5 was referred by their psychiatrist because they were judged to lack the capacity to make a decision about anti-psychotic medication. Factors contributing to such incapacity included lacking insight into their psychosis and need for treatment. Cognitive deficits were also indicated.

Process

Participant 5 was seen for just 1 session lasting about 30 minutes during which the participant was interviewed by the researcher using the MacCAT-T. The participant was judged to be too acutely unwell with psychotic symptoms by their clinical team for the sessions to progress. However, the participant was not judged to have lost research participant capacity and agreed that the researcher could still continue with the process without their involvement. This included reviewing case notes, speaking with clinicians and sharing the resulting formulation with the clinical team.

Background

As can be seen in **Table 2**, Participant 5 was aged between 32 and 41, was of Caucasian ethnicity, had received a diagnosis of schizophrenia over 10 years ago and was prescribed clozapine. The participant had a particularly difficult upbringing. The participant's parents separated within the first couple of years of their birth. Subsequently, the participant lived with their mother and step-father, both of whom abused alcohol and were physically and emotionally abusive to the participant. At one stage in their childhood, the participant had re-established contact with their biological father. Although the participant wanted to move in with their father, their mother did not permit this. The participant had their first contact with psychiatric services before their teens after overdosing on sleeping tablets. The participant's offending behaviour began around this time which included assault, housebreaking and shoplifting. The participant also began to abuse substances. The participant was taken into

foster care and spent most of their teens in different institutions. The participant's schooling was disrupted and they had been assessed as having low average intelligence. The participant's psychosis emerged in their late teens while in a young offenders' institution. The participant had spent the majority of their adult life in hospital including more than the last 10 years. The participant's periods in the community were marked by substance misuse. The participant also had a history of attempted suicides. In recent times, the participant had been engaging in both suicidal and self-harming behaviour. The participant had deteriorating physical health and had hepatitis B and C.

Assessment Results

Participant 5's results from the MacCAT-T and PANSS are provided in the Appendix. The MacCAT-T indicated that the participant had a particular impairment in appreciation but also had difficulties with understanding and reasoning (Grisso *et al*., 1997; Palmer *et al*., 2004). Retention difficulties, also related to impaired TDMC, were thought to be present as well. The PANSS, which was administered with clinicians involved in the participant's care, indicated that the participant had a predominantly positive symptom profile (Palmer *et al*., 2004). Notable scores from the PANSS indicated that the participant had extreme persecutory delusions as well as severe auditory hallucinatory behaviour and conceptual disorganisation. The general psychopathology subscale of the PANSS also indicated that the participant had moderate severe anxiety and severe difficulties with tension, depression, uncooperativeness and poor attention. The supplementary assessment (as described in the Intervention section in the Method) indicated that the participant had marked low self-esteem and self-esteem and mood instability. Poor cognitive functioning and an externalising attributional bias were also indicated to be present to a marked extent. Other information was derived from the cognitive-behavioural interview of the first session including capacity relevant appraisals.

Formulation

A full formulation incorporating the results from the assessments regarding Participant 5 can be seen in **Figure 6**. The participant had experienced a great deal of neglect, abuse and social defeat. The participant had spent the majority of their life in institutions. The participant was socially excluded and no doubt very lonely. Influenced by these and other external experiences (e.g., substance misuse, poor physical health), the participant's key appraisals appeared to be in conflict with each other. These appraisals seemed to fluctuate from explicit to implicit. On an often implicit level, the participant appeared to appraise their experiences – both internal

experiences (i.e., intrusive thoughts/voices) and external experiences – as meaning that they had no future and were weak, worthless and unlovable; they appeared to associate illness with these attributes. To protect against implicit negative thoughts associated with illness, the participant often appeared to appraise their experiences as meaning that they were a "hard man" and a "survivor" and that staff were trying to kill them with poisoned clozapine. The participant's appraisals appeared to be influenced by their cognitive resources. For example, the participant's belief about the hostile intentions of staff appeared to be influenced by their externalising attributional bias. Moderating the negative effect of the participant's cognitive resources was likely to be metacognitive awareness/beliefs of these resources. For example, the participant's self-defeating metacognitive belief about cognitive impairment (i.e., "I'm stupid") made it less likely that they took steps to enhance their cognitive functioning. The participant's cognitive resources not only appeared to influence the participant's appraisals but they also appeared to have a direct effect on capacity. For example, the participant's poor cognitive functioning likely affected the degree to which they could understand, reason with and remember treatment-relevant information. Of course, the participant's appraisals also would have had a direct effect on capacity including appreciation. Regarding emotion, the participant's appraisals appeared to lead to very high emotional arousal – ranging from fear, anxiety, anger and elation to hopelessness, loneliness and depression. High levels of emotion are known to affect people's ability to think clearly, and may therefore have had a direct effect on the participant's ability to reason clearly or understand information.

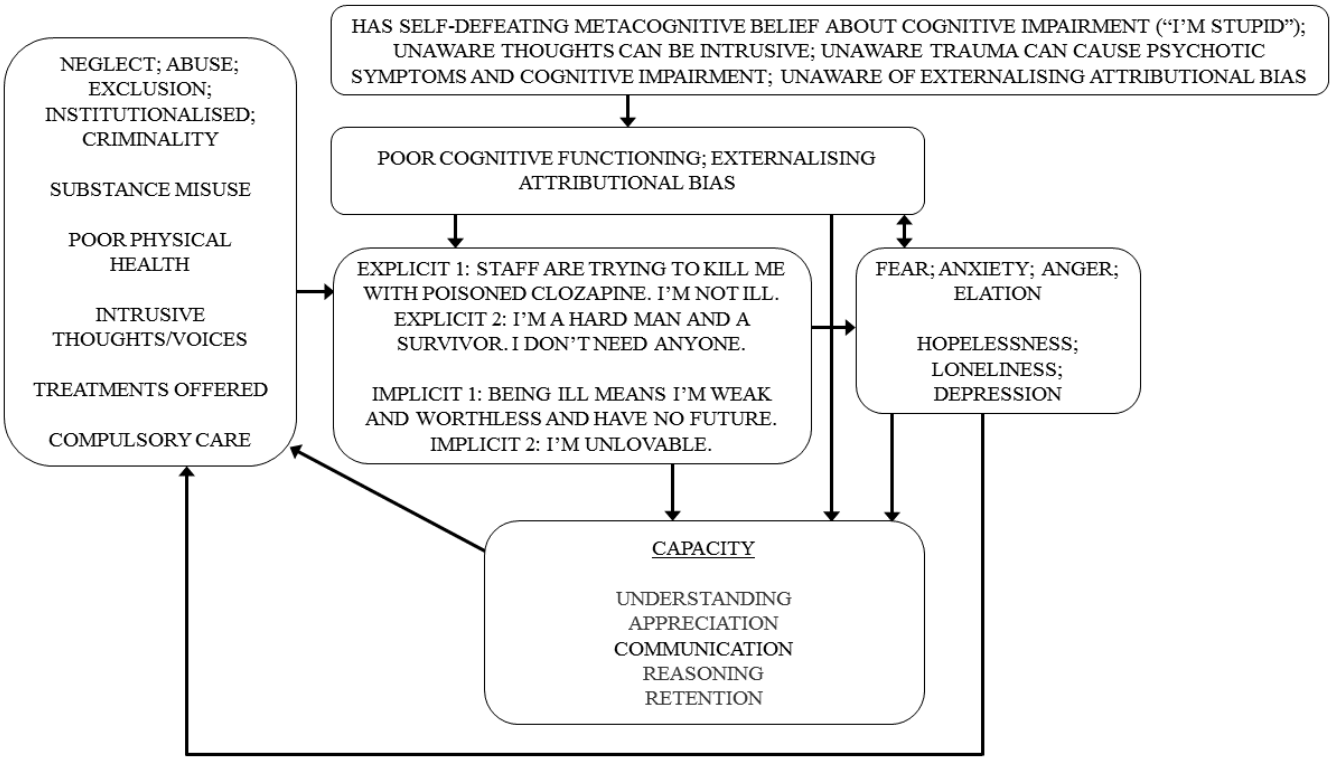


Figure 6. Case formulation for Participant 5

Further Intervention Implications

In terms of supporting capacity and autonomy, we made the following recommendations to clinician participants involved in the care of Participant 5:

- The participant may benefit from a sustained period of regular befriending to improve their loneliness, mood and self-worth. This could improve their cognitive impairment and reduce their fears of staff wanting to get rid of them.
- All staff need to consider how they can help participant feel more valued, and not ignored, and those in charge of care in the ward need to consider carefully how any positive change can be sustained.
- During a period of recovery, the participant may benefit from learning about the possible relationship between what has happened to them in their life and their cognitive impairment and psychotic symptoms. The participant may also benefit from an intervention designed to maintain their self-esteem, and address their internalised stigma.

- If the participant's self-esteem can be improved sufficiently, then they may benefit from an intervention designed to address their externalising bias.

Outcomes and Feedback

As described in the Process section above, the clinical team judged Participant 5 to be too acutely unwell with psychotic symptoms for the participant to continue with the intervention beyond the first session. The clinical team did not believe that the participant had been adversely affected by the intervention. No post-intervention assessment was scheduled with the participant.

Summary of Outcomes

A summary of the main outcomes regarding both patient and clinician participants is provided below.

Feasibility

In terms of feasibility, we were relatively successful in our inclusion of patient participants in the intervention and its evaluation. Regarding the recruitment aspect, we reached our minimum target of recruiting 5 patient participants, thereby meeting the recommendation of a recent concept analysis in relation to the number of patients needed for a case series (Abu-Zidan *et al.*, 2012). Indeed, we recruited 5 patient participants from 11 referrals in Site 1; thus, our referral:recruitment ratio in Site 1 was approximately 2:1. One of these patient referrals was deemed inappropriate, which meant that there were 10 eligible patient referrals in Site 1. Five of these 10 eligible patient referrals agreed to participate (50%), therefore suggesting relatively good willingness to be recruited. However, we received just 3 patient referrals in Site 2 and we were unable to recruit any of these; thus, our recruitment in Site 2 was unsuccessful. It is worth noting though that patients in Site 1 were resident for a relatively longer period of time than patients in Site 2, which was designed for only short-term 'intensive' psychiatric care.

Retention was good, with no patient participant completely withdrawing from the study. Adherence to the intervention protocol was also reasonable, with no patient participant not attending any sessions. Indeed, 3 of the patient participants attended all of their sessions, with 2 of these attending 5 sessions lasting no longer than an hour each and the other attending 10

sessions averaging about 30 minutes each. These 3 patient participants also completed all or almost all of the structured assessments. Work with these 3 patient participants indicated the importance of engagement and some of the difficulties in the process. However, once engaged, these 3 patient participants collaborated effectively in the process. Indeed, these 3 patient participants had very high perceptions of collaboration or alliance, as indicated by their scores on the post-intervention WAI (see **Table 4**). However, 2 of the patient participants only partially adhered to the intervention protocol, with one discontinuing after the second session and the other not being able to proceed after the first session. Work with these 2 patient participants indicated disengagement due to different reasons. For one of these patient participants, it appeared that the interaction had focused too soon on topics that were emotionally salient or potentially upsetting, and for the other one, it appeared that they were too acutely unwell with psychotic symptoms. Moreover, adherence to the post-intervention assessment among the patient participants was also reasonable, with the 3 intervention completers completing all of the measures and one of the intervention discontinuers completing a measure of adverse effects (AEQ).

We also found that it was feasible to include clinicians in the intervention and evaluation processes. Only one clinician did not respond to an invitation to attend a case formulation presentation relating to a patient participant. Thirteen clinicians involved in the care of the 5 patient participants attended the case formulation presentations and all of these participated in the research and completed the research measures. In fact, 2 of these clinician participants involved in the care of 2 of the patient participants attended 2 case formulation presentations, which meant that the clinician participants provided 15 datasets in total. Therefore, clinicians showed a good willingness to be recruited, engage with the intervention process and complete the research measures. In total, 6 case formulation presentations were delivered, of which 2 of these were for the same patient participant. Six clinicians attended a presentation for (patient) Participant 1, 4 clinicians attended a presentation for (patient) Participant 2, 2 clinicians attended a presentation for (patient) Participant 3, 2 clinicians attended a presentation for (patient) Participant 4 and one clinician attended a presentation for (patient) Participant 5.

Acceptability

We found that the intervention was acceptable to the 3 patient participants who completed the intervention, as indicated by very high scores on the post-intervention AQ (see **Table 4**). We

also found that the case formulation presentations were acceptable to clinician participants, as indicated by very high scores on 3 items of the post-formulation CFS (see **Table 5**). Indeed, the clinician participants strongly believed that the formulations cohered with their knowledge of the patient participant and were comprehensive and accurate. There was also no evidence that the case formulation presentations of the intervention discontinuers (Participant 3 and Participant 5) were less acceptable than the case formulation presentations of the intervention completers (Participant 1, Participant 2 and Participant 4) according to clinician participants. Indeed, all 3 of the clinician participants who attended the case formulation presentations of the intervention discontinuers believed "very much" (which is the highest possible rating) that the formulations cohered with their knowledge of the patient participant and were comprehensive and accurate.

Preliminary Utility/Efficacy

Preliminary utility/efficacy of the intervention among intervention completers was demonstrated by baseline and post-intervention scores on a measure of patient participants' reasons for incapacity (RIQ-P) and a measure of the researcher's perception of the patient participants' knowledge/insight of the factors regarding incapacity (IKI-R).

Inter-rater reliability of the RIQ-P and RIQ-C (a measure of clinician participants' reasons for incapacity) was firstly established by measuring the percent of agreement between the 2 expert raters. Percent of agreement was high at 91%. As such, the scores of the 2 expert raters were averaged together and used in the subsequent analyses.

The pre- and post-RIQ-P scores indicated that the 3 patient participants who completed the intervention provided a richer understanding of the factors that may impair their TDMC at post-intervention in comparison to baseline (see **Table 4**). Indeed, when the 3 patient participants were grouped together, there was a very large increase in richness with regard to their understanding of the aforementioned factors over the course of the intervention, as indicated by a Cohen's *d* of 2.16 (see **Table 4**). The pre- and post-IKI-R scores also indicated that the researcher believed that the 3 patient participants had become more knowledgeable/insightful of the factors that may impair their TDMC (see **Table 4**). Indeed, among the 3 patient participants, there was a very large increase in their knowledge/insight of the aforementioned factors over the course of the intervention from the perspective of the researcher, as indicated by a Cohen's *d* of 1.54 (see **Table 4**). Moreover, a measure of the

researcher's perception of whether the patient participants' knowledge/insight of the aforementioned factors had improved since baseline (IKI-I-R), which was just administered at post-intervention, also complimented the pre- and post-IKI-R scores (see **Table 4**). However, while one of the 3 patient participants' own impression of their knowledge of the aforementioned factors had increased over the course of the intervention, the other 2 patient participants' own impression of their knowledge of the aforementioned factors had remained the same, as indicated by the pre- and post-IKI-P scores (see **Table 4**). Indeed, the latter 2 patient participants rated their knowledge of the aforementioned factors highly at both baseline and post-intervention.

Preliminary utility/efficacy of the case formulation presentations according to clinician participants was also demonstrated by pre- and post-formulation scores on the aforementioned RIQ-C and 6 items of the CFS. The pre- and post-RIQ-C scores indicated that the clinician participants as a whole provided a richer understanding of the factors that may impair the patient participants' TDMC after the presentation of the case formulations compared to beforehand. Indeed, the size of the change was very large, as indicated by a Cohen's *d* of 1.36 (95% CI = 0.63 to 2.07; N = 15) (see **Table 5**). Moreover, the pre- and post-CFS scores indicated that the clinician participants as a whole had an enhancement across 3 different areas after the presentation of the case formulations compared to beforehand. Indeed, they had: greater *knowledge* regarding the aetiology and maintenance of incapacity of the patient participant as well as possible interventions/strategies to support the capacity of the patient participant, greater *confidence* regarding supporting the capacity of the patient participant, and more positive *attitudes* regarding supporting capacity – both in general and specifically with regard to the patient participant. The size of the changes ranged from small for "I believe that supporting capacity is part of my role" (Cohen's *d* = 0.40; 95% CI = –0.20 to 0.99; N = 15) to very large for "I appreciate possible interventions/ strategies to support the capacity of the patient in question" (Cohen's *d* = 1.64; 95% CI = 0.82 to 2.44; N = 15) (see **Table 5**).

Preliminary Safety

Preliminary safety of the intervention was indicated by baseline and post-intervention scores on measures of depression (CDSS) and global illness severity (CGI-R, CGI-I-R and CGI-P), as well as post-intervention or point of discontinuation scores on a measure of adverse effects (AEQ). The AEQ scores among the 3 patient participants who completed the intervention

indicated no adverse effects from intervention involvement (see **Table 4**). In addition, the CDSS, CGI-R, CGI-I-R and CGI-P scores indicated that these patient participants' mental health difficulties including any depressive symptoms had not worsened over the course of the intervention (see **Table 4**). Moreover, the AEQ responses of one of the intervention discontinuers (Participant 3) did not indicate any concerning adverse effects from intervention involvement. Although broaching the past was perceived by the researcher to have been the trigger for discontinuation, this patient participant only rated "very little" to "Taking part made me think too much about bad things that have happened in the past" (see Outcomes and Feedback section of the case report of Participant 3 for more detail). The clinical team did not believe that the other intervention discontinuer (Participant 5) had been adversely affected by the intervention either.

Table 4. Individual scores, mean scores and Cohen's *d* effect sizes regarding main outcome variables reported at baseline and post-intervention among patient participants who completed the intervention (*n* = 3)

	Participant 1		Participant 2		Participant 4		Mean (SD)		
Variable	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Cohen's *d*[a]**
Feasibility									
WAI[b]	–	63	–	60	–	63	–	62.00 (1.73)	–
Acceptability									
AQ[c]	–	56	–	52	–	56	–	54.67 (2.31)	–
Preliminary utility/efficacy									
RIQ-P[d]	3.5	5.5	1	4	2	4	2.17 (1.26)	4.50 (0.87)	2.16
IKI-R[e]	3	5	1	3	3	4	2.33 (1.15)	4.00 (1.00)	1.54
IKI-I-R[f]	–	6	–	5	–	6	–	5.67 (0.58)	–
IKI-P[g]	4	5	5	5	6	6	5.00 (1.00)	5.33 (0.58)	0.41
Preliminary safety									
AEQ[h]	–	0	–	2	–	0	–	0.67 (1.15)	–
CDSS[i]	2	1	4	2	0	0	2.00 (2.00)	1.00 (1.00)	–0.63
CGI-R[j]	4	4	4	4	4	3	4.00 (0.00)	3.67 (0.58)	–0.82
CGI-I-R[k]	–	3	–	3	–	3	–	3.00 (0.00)	–
CGI-P[l]	2	2	3	3	1	1	2.00 (1.00)	2.00 (1.00)	0.00

Abbreviations: AQ, Acceptability Questionnaire; AEQ, Adverse Effects Questionnaire; CDSS, Calgary Depression Rating Scale for Schizophrenia; CGI-P, Clinical Global Impression Scale – Patient Version; CGI-I-R, Clinical Global Impression – Improvement Scale – Researcher Version; CGI-R, Clinical Global Impression Scale – Researcher Version; IKI-P, Incapacity Knowledge Impression Scale – Patient Version; IKI-I-R, Incapacity Knowledge Impression – Improvement Scale – Researcher Version; IKI-R, Incapacity Knowledge Impression Scale – Researcher Version; RIQ-P, Reasons for Incapacity Questionnaire – Patient Version; WAI, Working Alliance Inventory.

[a]A positive (+) Cohen's *d* value indicates a higher score at post-intervention compared to baseline.

[b]Possible scores can range from 9 to 63, with higher scores indicating more positive perceptions of the working alliance.

[c]Possible scores can range from 8 to 56, with higher scores indicating higher acceptability.

[d]Possible scores can range from 1 ("not at all rich") to 6 ("extremely rich"), with higher scores indicating a richer understanding of the factors that may impair TDMC.

[e]Possible scores can range from 1 ("not at all knowledgeable/insightful") to 6 ("extremely knowledgeable/insightful"), with a higher score indicating that the patient participant had more knowledge/insight of the factors that may impair their TDMC, from the researcher's perspective.

[f]Possible scores can range from 1 to 7 (1 = "very much worse"; 2 = "much worse"; 3 = "minimally worse"; 4 = "no change from baseline"; 5 = "minimally improved"; 6 = "much improved"; 7 = "very much improved"), with a higher score indicating a greater improvement in the patient participant's knowledge/insight of the factors that may impair their TDMC since baseline, from the researcher's perspective.

[g]Possible scores can range from 1 ("not at all knowledgeable/insightful") to 6 ("extremely knowledgeable/insightful"), with a higher score indicating that the patient participant's own impression of their knowledge/insight of the factors that may impair their TDMC was greater.

[h]Possible scores can range from 0 to 104, with higher scores indicating potentially greater adverse effects from intervention involvement.

[i]Possible scores can range from 0 to 27, with higher scores indicating greater depressive symptoms.

[j]Possible scores can range from 1 ("normal, not at all ill") to 7 ("extremely ill"), with a higher score indicating that the patient participant had more severe mental health difficulties, from the researcher's perspective.

[k]Possible scores can range from 1 to 7 (1 = "very much improved"; 2 = "much improved"; 3 = "minimally improved"; 4 = "no change from baseline"; 5 = "minimally worse"; 6 = "much worse"; 7 = "very much worse"), with a higher score indicating a more severe deterioration in the patient participant's mental health since baseline, from the researcher's perspective.

[l]Possible scores can range from 1 ("normal, not at all ill") to 7 ("extremely ill"), with a higher score indicating that the patient participant's own impression of their mental health difficulties was more severe.

Table 5. Mean scores and Cohen's *d* effect sizes with 95% confidence intervals (CIs) regarding main outcome variables reported at pre- and post-formulation among clinician participants (*n* = 15)

Variable	Mean (SD)		Cohen's *d*[a]	95% CI
	Pre	Post		
Acceptability				
CFS item – I believe that the formulation presented in this session coheres with my knowledge of the patient[b]	–	3.67 (0.62)	–	–
CFS item – I believe that the formulation was comprehensive[b]	–	3.73 (0.46)	–	–
CFS item – I believe that the formulation presented in this session was accurate[b]	–	3.80 (0.41)	–	–
Preliminary utility/efficacy				
Reasons for Incapacity Questionnaire – Clinician Version (RIQ-C)[c]	2.63 (0.83)	3.70 (0.73)	1.36	0.63 to 2.07
CFS (*knowledge*) item – I understand what might cause and maintain the incapacity of the patient in question[b]	2.07 (0.96)	3.13 (0.64)	1.31	0.65 to 1.94
CFS (*knowledge*) item – I appreciate possible interventions/ strategies to support the capacity of the patient in question[b]	2.07 (0.80)	3.20 (0.56)	1.64	0.82 to 2.44
CFS (*confidence*) item – I feel confident in supporting the capacity of the patient in question[b]	1.93 (1.03)	2.67 (0.90)	0.76	0.29 to 1.21
CFS (*attitude*) item – I believe that it is feasible to support the capacity of the patient in question[b]	2.13 (1.06)	2.67 (0.90)	0.54	0.10 to 0.97
CFS (*attitude*) item – I believe that supporting capacity matters[b]	3.13 (1.13)	3.67 (0.72)	0.56	0.11 to 1.00
CFS (*attitude*) item – I believe that supporting capacity is part of my role[b]	3.13 (1.19)	3.53 (0.74)	0.40	–0.20 to 0.99

Abbreviation: CFS, Case Formulation Scale.
[a]A positive (+) Cohen's *d* value indicates a higher score at post-intervention compared to baseline.
[b]Possible scores can range from 0 to 4 (0 = "not at all"; 1 = "a little"; 2 = "somewhat"; 3 = "quite a lot"; 4 = "very much").
[c]Possible scores can range from 1 ("not at all rich") to 6 ("extremely rich"), with higher scores indicating a richer understanding of the factors that may impair TDMC.

DISCUSSION

Summary of Main Findings

The findings of this study are promising, both in terms of the feasibility and acceptability of the intervention involving assessing and formulating impaired TDMC in patients with psychosis, and of the preliminary data regarding utility/efficacy and safety. With regard to feasibility, we were relatively successful in our inclusion of patients in the intervention and its evaluation: we reached our minimum target of recruiting 5 patient participants; we retained all of them in the study; we implemented our intervention protocol (with some modifications) with 3 of them and partially implemented it with the other 2; we collaborated effectively with 3 of them [as indicated by very high scores on the post-intervention working alliance measure (WAI)]; we assessed a wide range of outcome measures with 3 of them and administered an adverse effects measure (AEQ) with 4 of them. We were also successful in our inclusion of clinicians in the intervention and evaluation processes: we recruited 13 clinician participants involved in the care of the 5 patient participants and all of these attended the case formulation presentations (with 2 of these attending 2 case formulation presentations); we were able to arrange 6 case formulation presentations in total (with 2 of these being for the same patient participant); we were able to administer outcome measures with all of the clinician participants. Moreover, it is worth noting that while 2 of the 5 patient participants only partially adhered to our intervention protocol, we were still able to produce psychological formulations of impaired TDMC for these intervention discontinuers. In comparison to the formulations of the intervention completers, we relied more on data from other sources for the development of these formulations, including case note review, observation and interviews with staff. Such limited engagement is considered to reflect the reality of working with certain patients with psychosis with impaired TDMC and does not necessarily cause concern about the feasibility of developing psychological formulations of impaired TDMC.

In regards to acceptability, we found that the intervention was acceptable to the 3 patient participants who completed the intervention, as indicated by very high scores on the post-intervention acceptability questionnaire (AQ). We also found that the case formulation presentations were acceptable to clinician participants, as indicated by their ratings of belief strength on 3 items of the post-formulation case formulation measure (CFS); specifically, they strongly believed that the formulations cohered with their knowledge of the patient participant

and were comprehensive and accurate. Moreover, we found no evidence that the case formulation presentations of the intervention discontinuers were less acceptable than the case formulation presentations of the intervention completers according to clinician participants.

The pre and post scores on the measures of patient and clinician participants' reasons for incapacity (RIQ-P and RIQ-C), which had been blindly rated by 2 independent experts, revealed some promising findings: when aggregated together, the 3 patient participants who completed the intervention provided a much richer understanding of the factors that may impair their TDMC (in the very large range) at post-intervention in comparison to baseline, and the clinician participants as a whole provided a much richer understanding of the factors that may impair the patient participants' TDMC (in the very large range) after the presentation of the case formulations compared to beforehand. Moreover, the pre and post scores on the CFS indicated that the clinician participants as a whole had an enhancement across 3 different areas after the presentation of the case formulations compared to beforehand. Indeed, they had: greater knowledge regarding the aetiology and maintenance of incapacity of the patient participant as well as possible interventions/strategies to support the capacity of the patient participant (in the very large range), greater confidence regarding supporting the capacity of the patient participant (in the moderate range), and more positive attitudes regarding supporting capacity – both in general and specifically with regard to the patient participant (in the small to moderate range). These findings, and others as described in the Results section, provide preliminary data regarding the utility/efficacy of the intervention.

The AEQ scores among the patient participants who completed the intervention indicated no adverse effects from intervention involvement. In addition, the baseline and post-intervention scores on measures of depression (CDSS) and global illness severity (CGI-R, CGI-I-R and CGI-P) indicated that these patient participants' mental health difficulties including any depressive symptoms had not worsened over the course of the intervention. However, it is particularly important to consider the safety of the intervention for intervention discontinuers. As mentioned, 2 of the patient participants only partially adhered to the intervention protocol: one disengaged after the second session and the other was judged by their clinical team to be unable to proceed after the first session. With regard to the first of these patient participants, it appeared that the reason for their disengagement was that the interaction had focused too soon on topics that were emotionally salient or potentially upsetting, which appeared to be related to the past. However, their AEQ responses at point of discontinuation did not indicate any concerning adverse effects from intervention involvement. Regarding the second of these

patient participants, it appeared that the judgement of their clinical team regarding discontinuation was based on the view that they were too acutely unwell with psychotic symptoms. However, their clinical team did not believe that they had been adversely affected by the intervention. Therefore, when considered in their totality, these findings provide preliminary data regarding the safety of the intervention for patients.

Clinical and Theoretical Implications

One of the advantages of a case series like this study is its ability to inform the development and refinement of intervention protocols before they are studied in more advanced trials (Bhandari & Joensson, 2009). So what have we learned? Initially, we came across some defensiveness by patients when discussing the reason for their referral, which included that they had been judged to lack TDMC by their referrer. Reflecting on this, we learned that engagement in the intervention is more likely when we take a neutral stance on issues such as TDMC and need for care. Therefore, we recommend that clinicians should, if asked, advise their patient that they are not taking a position on whether the patient lacks TDMC or has a need for care but that their role is instead to work with the patient to understand why such a judgement has been made and to identify what could be done to achieve a judgement of regained TDMC. Importantly, this focus on understanding why there was a judgement of impaired TDMC, rather than impaired TDMC itself, facilitates engagement and allows the formulation to be developed.

We also learned that for some patients it may be necessary to spend time talking with them about their general interests and provide sufficient space for them to 'tell their story' as a way of engagement. However, it is important to be aware that there may be disadvantages to spending a long time engaging or befriending patients with psychosis. Indeed, the patient may not experience improvement and the clinician may find it difficult to introduce structure and focus if this has not been present from the outset (Morrison, Renton, Dunn, Williams, & Bentall, 2003).

On the other hand, we learned that some patients may be less able and/or willing to share their story and talk about their general interests. In these cases, we learned that another option to engagement may be to gather the required information through the use of structured assessments, including self-report questionnaires, structured interviews, psychometric testing and reaction-time procedures. We found that the 3 intervention completers were generally

interested in completing these assessments, learning what they assess and discussing what their pattern of results might mean. Therefore, we recommend that clinicians should administer structured assessments if possible. Moreover, this more formal approach to assessment may produce more robust evidence, and patients and clinicians may view a formulation derived from this evidence as being more 'objective' than that derived from the typical (often unstructured) clinical assessment.

As mentioned, we believe that one patient participant disengaged because the interaction had focused too soon on topics that were emotionally salient or potentially upsetting. While we did not find any evidence of adverse effects from involving this patient participant in the intervention, it is possible that they would have been adversely affected if they had felt compelled to continue with the sessions. We recommend that clinicians are mindful of the risk of patients feeling coerced to attend assessments of TDMC and that proceeding with sessions might be unsafe/distressing.

It is of course highly preferable, for ethical and practical reasons, to work collaboratively with the referred patient and to develop a shared understanding. However, we learned that working collaboratively with the patient is not always possible. Indeed, we learned that it may be necessary to base our assessment and formulation of impaired TDMC mainly on case notes, observation and interviews with staff and family. Nevertheless, we believe that it may be possible to develop good quality formulations in this way. Indeed, the clinician participants who attended the case formulation presentations of the intervention discontinuers very strongly believed that the formulations cohered with their knowledge of the patient participant and were comprehensive and accurate.

A secondary aim of this study was to generate hypotheses regarding factors that might help or hinder TDMC in patients with psychosis. One of the main patterns we identified in our formulations was that delusional appraisals that threaten TDMC can have a protective function for the patient, a finding (which if further research finds to be robust) has important implications for the design and testing of interventions to support TDMC. This finding is also consistent with our recent meta-analytical investigation of the widely studied 'paranoia as defence' model (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001), which proposes that persecutory delusions arise as a way of protecting the individual from the effects of low implicit self-esteem. Although this model has been challenged (Garety & Freeman,

2013; Kesting & Lincoln, 2013; Tiernan, Tracey, & Shannon, 2014), we found clear evidence to support at least a 'weak' version of this model (Murphy *et al*., in preparation).

Strengths and Weaknesses

This study has some important strengths. First, this study, to the best of our knowledge, is the first of its kind to develop and pilot-test a structured protocol for assessing and formulating impaired TDMC in patients with psychosis. We demonstrated the feasibility and acceptability of this protocol and we produced preliminary data regarding utility/efficacy and safety. If the efficacy, effectiveness and safety of this protocol is demonstrated through further research, this protocol could be widely used by clinicians. Indeed, such a protocol might be used to construct formulations of the factors that help or hinder TDMC in patients with psychosis which might in turn inform intervention strategies aimed at restoring capacity. Second, we employed a novel cognitive model of impaired TDMC in psychosis (Hutton *et al*., in preparation) to inform the development of our formulations. This model appeared to have face validity among clinician participants; indeed, they strongly believed that the formulations based on this model cohered with their knowledge of the patient participant and were comprehensive and accurate. Importantly, this model has key implications for supporting TDMC among patients with psychosis (Hutton *et al*., in preparation). Third, patient and clinician participants' reasons for incapacity, pre and post assessment and formulation, were blindly rated by 2 independent experts. We believe that this procedure added rigour to our research methodology; indeed, this meant that we were able to some extent control for the potential bias of raters toward perceiving results that would confirm any explicit or implicit hypotheses. Finally, we presented detailed information about every participating patient. We hope that this provided added value for the reader, including a clear rationale for any hypotheses regarding factors that might help or hinder TDMC in patients with psychosis.

Despite these strengths, there were several limitations to this study. First, there were only 5 patient participants and 13 clinician participants. Although a case series like ours is an essential first step in the process of developing and testing new intervention protocols, only an adequately powered clinical trial can provide definitive evidence of efficacy and safety. Second, data collection regarding the outcome assessments were conducted by the researcher, who also carried out the intervention. This may have led to biased feedback and may have inflated estimates of effect size (Wykes, Steel, Everitt, & Tarrier, 2008). Future research

evaluating our intervention protocol should, if possible, employ independent outcome collectors. Third, although we attempted to recruit participants from both forensic and non-forensic mental health settings, we were only successful in recruiting them from the former. This meant that we were only able to demonstrate the feasibility and acceptability of our intervention protocol in a limited setting. Future research should consider sampling from wider and more representative settings. Finally, while we acquired quantitative data from a wide range of outcome assessments, we did not employ a systematic approach to obtaining qualitative data. Future research might consider incorporating such an approach to allow careful assessment of participants' views regarding our intervention protocol.

Future Research

Our findings suggest that our intervention protocol, which provides a guidance to assessing and formulating impaired TDMC in patients with psychosis, should be evaluated further, while taking into consideration our aforementioned lessons learnt and study strengths and limitations. A larger case series might be useful to explore whether any further modifications are required for this group. Following modifications aimed at improving generalisability and real-life application of our intervention protocol, a randomised controlled trial may be warranted.

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Supplementary Appendix to:

Murphy, P., O'Rourke, S., McRitchie, R., Allan, K., Hutton, P. (in preparation). A case series examining the feasibility and acceptability of psychological assessment and formulation of impaired treatment decision-making capacity in psychosis.

Content of Supplementary Appendix

A. Protocol
B. Individual patient participant scores on the structured assessments (as part of the intervention) and corresponding norms

Appendix A: Protocol

Research Questions / Objectives

2) What is the principal research question / objective? (IRAS A10)

The primary aim of this project is to examine the feasibility and acceptability of assessing and formulating impaired TDMC among patients with psychosis, and produce preliminary data regarding utility and safety.

3) What are the secondary research questions / objectives if applicable? (IRAS A11)

The secondary aim of this work is to produce hypotheses regarding factors that might help or hinder TDMC in these patients.

Methodology

4) Please give a full summary of your design and methodology. It should be clear exactly what will happen at each stage of the project. (Relevant to IRAS A13)

Study setting:

The research will be carried out across two different sites – NHS Lothian and NHS Grampian. With regard to NHS Lothian, the research will take place in the Intensive Psychiatric Care Unit (IPCU) and possibly other units at the Royal Edinburgh Hospital. The IPCU provides intensive care psychiatric facilities to Lothian (total catchment population approximately 900,000). It is a 12 bedded ward (mixed sex). All the patients are detained, usually under civil orders, and are classified as 'low secure' in the matrix of security. Almost all of the patients have a diagnosis of a psychotic disorder. Most of the patients are from either general adult wards or rehabilitation wards and have been transferred due to concerns about risk: either to themselves or others. There is a high level of staffing: for 12 patients there would be a minimum of 6 nursing staff on shift during working hours, plus the rest of the multi-disciplinary team. Moreover, there is one Consultant Psychiatrist, and two junior doctors: a psychiatry trainee and a FY2.

With regard to NHS Grampian, the research will take place in the Grampian Forensic Mental Health Service, which includes the Blair Unit at Royal Cornhill Hospital and the Great Western Lodge. Grampian Forensic Mental Health Service provides forensic and intensive care psychiatric facilities to Grampian Region, Orkney and Shetland (total catchment population approximately 500,000). Within the Blair Unit there are two acute wards: one 8 bedded Forensic Ward (male), and one 11 bedded IPCU (mixed sex). There is also a 16 bedded Forensic Rehabilitation Ward (male) within the Blair Unit, which provides the opportunity for slow stream rehabilitation. Great Western Lodge is an 8 bedded community in-patient unit (male); patients are generally admitted to Great Western Lodge following a period of treatment within the Blair Unit. All the patients are detained, under a civil or criminal order, and are classified as 'low secure' in the matrix of security. Almost all of the patients have a diagnosis of a psychotic disorder. Admissions to the Forensic Ward generally come from the Prisons, the Courts, and the State Hospital, Carstairs. Patients admitted for psychiatric assessment from court or prison may remain in the Blair Unit for treatment or be returned to the criminal justice system. Patients transferred from the State Hospital are generally in a process of slow rehabilitation back into the community through progressively lower levels of security. Admissions to the IPCU generally come from other ward settings in Aberdeen and Elgin because they require short-term acute containment in a secure environment. Once these patients improve, they are returned to their referring catchment area ward. However, the IPCU also accepts female forensic patients through the same pathway as those who are admitted to the Forensic Ward. Within Grampian Forensic Mental Health Service, there is a multi-disciplinary team of nursing staff, medical staff, clinical psychology staff, social workers, occupational therapists and a clinical pharmacist. There is also a nurse led outreach team.

Study design:

A simple case series design incorporating quantitative and qualitative methodology will be used to (a) examine the acceptability, feasibility, utility and safety of psychological assessment and formulation of impaired

treatment decision-making capacity (TDMC) in patients with psychosis, and (b) generate hypotheses regarding psychological and contextual factors that may help or hinder TDMC in this group.

It is worth noting that there is a distinction between measures that will be administered for research purposes (and thus may not benefit the participant, but do involve effort and time on their part) and measures that will be administered as part of the 'intervention' (i.e., measures administered with the intention of producing knowledge that will directly help the participant - and not administered solely for research reasons). The only measures that will be administered solely for the purposes of the research are those assessing acceptability, feasibility, utility and safety of psychological assessment and formulation of impaired TDMC. These include measures of subjective understanding of impaired capacity before and after the assessment and formulation process as well as a post-interview assessment (see 'Study procedure' below).

Recruitment & consent procedure:

The referring psychiatrist will identify the potential patient participant who meets the study criteria and decide whether or not they have research participant capacity. If the potential patient participant is judged to have research participant capacity, their key worker will meet with them and provide them with an information leaflet, written in plain English, describing the study and what will be asked of them should they wish to participate. No sooner than 48 hours later, their key worker will ask them whether they are interested in taking part and, if so, to sign an opt-in slip to permit the researcher to contact them directly and answer any further questions they may have, and to permit the key worker to share with the researcher any important information relevant to a proper assessment of risk. If the potential patient participant does not sign this opt-in slip for either further contact or the sharing of risk-relevant information, they will be unable to participate further in the research.

If the potential patient participant signs this opt-in slip they will then be contacted by the researcher, who will attempt to answer any questions they may have. The researcher will assess their research participant capacity [taking into account the advice on assessing capacity in the Code of Practice that accompanies the Adults with Incapacity (Scotland) Act 2000] and verify that the potential patient participant meets the inclusion/exclusion criteria. If this capacity is present, and if criteria are met, then they will be asked to sign a written consent form, and providing they do, an appointment will be made to begin the sessions. Consent is a continuous process, so the patient participant will be regularly reminded that they can withdraw at any time without any adverse consequences for them or the care they receive.

If the potential patient participant is judged to lack research participant capacity, their health care team will identify their guardian or welfare attorney or, if there is no such person, their nearest relative. Their key worker from their health care team will make a telephone call to this person. Their key worker will explain to this person that the potential patient participant has been judged to lack research participant capacity and that there is a researcher standing nearby who would like to discuss the possible involvement of the potential patient participant in a study. If this person agrees to have this discussion with the researcher, they will be provided with information about the study and what it will entail for the potential patient participant. This person will be told that they will be asked to give consent on behalf of the potential patient participant, that they are free to decide whether they wish to make this decision or not, and that they are being asked to consider what the potential patient participant would want, and to set aside their own personal views when making this decision. This person will also be sent an information leaflet. No sooner than 48 hours after this telephone call, an appointment will be arranged between the researcher and this person. The researcher will ask this person whether they would like to give consent on behalf of the potential patient participant and, if so, to sign a written consent form. Providing they do, an initial appointment will be arranged between the researcher and potential patient participant. During this initial appointment, the researcher will provide the potential patient participant with information, according to their understanding, about the study. If the potential patient participant indicates unwillingness to participate in the study, they will not be included.

If a patient participant, who has been judged to lack research participant capacity, regains this capacity during the course of the study, they will be provided with an appropriate information sheet and consent form by the researcher that explains what has happened so far and what their on-going consent is being sought for. If a patient participant, who has been judged to have research participant capacity, loses this capacity during the course of the study and does not regain it within a reasonable period of time, an attempt will be made to seek the consent of the patient participant's guardian or welfare attorney or, if there is no such person, their nearest relative, as above.

It is also worth noting that the researcher will remain in regular contact with the clinical team and, prior to each appointment, will request an update about any changes in the patient participants' condition that may be relevant to their continued participation (e.g., if they experience an acute psychotic episode or become violent). If research activity needs to be suspended or terminated, this will be sensitively communicated to the patient participant by their key worker at an appropriate time.

Clinicians involved in the care of participating patients will also be invited to take part in the research process. Their participation will be limited to providing feedback on the utility and acceptability of the assessment and formulation process, and their views on the reasons for the patient's decisional incapacity. All potential clinician participants will be provided with a clinician-tailored participant information form and asked to complete a written consent form, and they will also be informed that they are free to withdraw at any point.

Study procedure:

All patient participants will complete a form to collect demographic and other clinical information. Their notes will already have been reviewed (with their consent) to avoid asking any unnecessary questions regarding this information. The concept of capacity will be explained, and they will be asked why they think they may have been judged to be unable, at present, to make their own treatment decisions. The reasons they give, and the degree to which they believe these reasons (recorded using a 0-100% conviction rating scale) will be recorded.

The assessment and formulation procedure will then commence. This will be as collaborative as possible, and will be conducted by the primary researcher over several sessions using (a) a comprehensive cognitive-behavioural interview guided by the model of formulation proposed by Tarrier and Callam (2001) and other cognitive models (Garety et al., 2001; Morrison, 2001), and (b) a set of structured assessments (interviews and questionnaires). More information about the assessment and formulation procedure is provided in the response to question (6), below.

The information obtained from the cognitive-behavioural interview and set of structured assessments will be used to collaboratively construct a cross-sectional formulation of the factors that may help or hinder treatment decision-making capacity (TDMC) for the individual patient participant. A shared longitudinal formulation will also be developed, incorporating consideration of the origin and development of impaired TDMC. All patient participants will receive a written letter documenting the shared formulation in simple, easy to understand language. This letter will also contain simple 'formulation diagrams' which outline the shared understanding in pictorial form. Potential strategies for restoring capacity will be derived from the formulation and highlighted in the form of an action plan, and this will be detailed in the letter. This letter, and the diagrams, will be shared with the clinical team if the patient participant agrees to this.

The Collaborative Case Conceptualisation – Rating Scale (CCC-RS: Padesky et al., 2011) will be used to assess the feasibility of collaboration in assessing and formulating TDMC, as well as the quality of the formulation process. This assessment will be carried out by a named collaborator, who will listen to recordings of the interviews. Interviews will only be recorded with the patient participant's consent.

With the patient participant's agreement, the resulting formulations may then be shared with the clinician participants and the rest of the clinical team during a multi-disciplinary 'formulation meeting', following previously described procedures (Holmes, 2002; Summers, 2006). Only one case formulation will be presented at each meeting. Consenting clinicians will be asked to specify, before and after the formulation meeting, the reasons why they think the individual in question lacks decisional capacity, and the degree to which they believe these reasons are true (using a 0-100% rating scale of belief conviction).

Consenting clinicians will then be interviewed individually by the primary researcher using a semi-structured interview format after the presentation of all of the case formulations, and basic demographic information will also be collected (e.g. age, gender, profession, years working in mental healthcare). This interview will assess perceived utility, safety and acceptability of the formulation process, and will contain both quantitative rating scales and open-ended qualitative questions.

Finally, patient participants will be invited to attend a post-interview assessment, where their views on the utility and acceptability of the assessment and formulation process will be assessed, again using a mixture of quantitative rating scales and open-ended questions. Careful consideration will be given to the potential patient participant for subjectively reported adverse effects of the formulation process, with specific questions probing this. They will again be asked why they think they may have been judged to be unable, at present, to make their

own decisions. The reasons they give, and the degree to which they believe these reasons (recorded using a 0-100% conviction rating scale) will again be recorded.

5) Please list the principal inclusion and exclusion criteria. (IRAS A17-1 and A17-2)

Inclusion and exclusion criteria for patient participants

Inclusion criteria will be as follows: (a) aged over 18 years; (b) able to be interviewed and complete the measures; (c) diagnosed with a schizophrenia-spectrum disorder (verified through patients' notes and symptomatic assessment); (d) enrolled as a patient (i) in the IPCU or one of the other wards at Royal Edinburgh Hospital or (ii) in Grampian Forensic Mental Health Service; (e) presumed or already judged to have impaired TDMC.

Patients will not be able to take part if they: (a) have moderate to severe learning disability; (b) have psychosis of predominantly organic origin (e.g. brain injury, physical health condition, epilepsy) or have a primary diagnosis of substance or alcohol use disorder; (c) cannot understand English sufficiently to engage in conversation without an interpreter.

Inclusion and exclusion criteria for clinician participants

Inclusion criteria will be as follows: (a) aged over 18 years and able to provide informed consent; (b) able to be interviewed; (c) working as a multi-disciplinary team member (i) in the IPCU or one of the other wards at Royal Edinburgh Hospital or (ii) in Grampian Forensic Mental Health Service; (d) familiar with the patient in the case presentation and have attended the case presentations. Non-consenting clinicians will be excluded from the study.

6) How will data be collected?

Assessment and formulation procedure:

The default number of sessions per patient participant will be five, with each session lasting no longer than one hour, so that patient participants do not have to sit for extended periods. Tea, coffee and water will be provided by the researcher with a scheduled break during each session. Patient participants will be informed that they can request an additional break and refreshment at any point.

Each of these sessions will consist of (a) a cognitive behavioural interview and (b) a set of structured assessments (interviews and questionnaires). The cognitive behavioural interview will allow :(i) the results from the previous session's structured assessments to be interpreted and discussed with the participant; (ii) a rationale for those measures administered in the current session to be shared; (iii) a collaborative formulation of impaired capacity to be developed (see below). Thus, the assessment and formulation will become gradually more comprehensive as the sessions progress. The following is a description of the content of each session, detailing which structured assessments will be administered:

Session 1:

Cognitive-behavioural interview
MacArthur Competence Assessment Tool – Treatment (MacCAT-T: Grisso et al., 1997)

Session 2:

Cognitive-behavioural interview
The Positive and Negative Syndrome Scale (PANSS: Kay et al., 1987)

Session 3:

Cognitive-behavioural interview
The Brief Neurocognitive Assessment (BNA: Fervaha et al., 2014)
The Beads Task (Huq et al., 1988)
The Cognitive Biases Questionnaire for psychosis (CBQp: Peters et al., 2014)
The Personal Beliefs about Experience Questionnaire (PBEQ: Pyle et al., 2015)
The Brief Core Schema Scale (BCSS: Fowler et al., 2006)

Session 4:

Cognitive-behavioural interview
The abbreviated version of the Scale to Assess Unawareness in Mental Disorder (SUMD: Michel et al., 2013)
The short-form version of the Depression Anxiety Stress Scale (DASS-21: Lovibond & Lovibond, 1995)
The Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1965)
The Penn State Worry Questionnaire (PSWQ: Meyer et al., 1990)
The Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006)

Session 5:

Cognitive-behavioural interview
The Attributional Style Questionnare parallel form (ASQpf: Lyon et al., 1994)
The Emotional Stroop Task (Kinderman, 1994)
The Young Mania Rating Scale (YMRS: Young et al., 1978)

Below is a description of each of the aforementioned measures that will be administered in the assessment and formulation sessions:

Cognitive-behavioural interview

Patient participants will be assessed by the primary researcher using a comprehensive cognitive-behavioural interview with a strongly collaborative focus. Elements of such an interview are well described by Morrison et al. (2004), and detailed guidance on working collaboratively in psychosis is provided by Hutton & Morrison (2013). The interview will focus on the role of cognitive appraisals of information relevant to the decision which the patient participant has been judged to lack capacity to make, and whether these appraisals help or hinder TDMC, and the role of affective (e.g. anxiety) and behavioural responses (e.g. avoidance) linked to these cognitive appraisals. Whether these affective and behavioural responses serve to maintain conviction or preoccupation with key appraisals will be examined in collaboration with the patient participant.

The contribution of pre-existing beliefs or "schemata" will also be investigated in a collaborative manner and included in the formulation, including positive and negative beliefs about psychotic phenomena, and positive and negative beliefs about their diagnosis. Relevant beliefs about self, others and the world will also be examined, as will the potential role and origin of cognitive processes, such as worry, rumination and self-criticism. The patient participant's particular strengths will also be assessed using the Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006), and incorporated into the formulation where possible.

The above information, together with information from the set of structured assessments, will be used to collaboratively construct a cross-sectional formulation of the factors that may help or hinder TDMC for the individual patient participant. A shared longitudinal formulation will also be developed, incorporating consideration of the origin and development of impaired TDMC. All patient participants will receive a written letter documenting the shared formulation in simple, easy to understand language. This letter will also contain simple 'formulation diagrams' which outline the shared understanding in pictorial form. Potential strategies for restoring capacity will be derived from the formulation and highlighted in the form of an action plan, and this will be detailed in the letter. This letter, and the diagrams, will be shared with the clinical team if the patient participant agrees to this.

As mentioned, this cognitive-behavioural interview will also be guided by the model of formulation proposed by Tarrier and Callam (2001), which emphasises the importance of incorporating systemic and contextual

factors. BPS guidance on how to assess capacity in general suggests that this model describes a potential representation of the relationships between cognitive and psycho-social elements within decision making, which may form the basis for longer-term development of a psychological model (BPS, 2006). This model can be utilised to hypothesize a range of psychological aspects of the individual patient participant that could affect their TDMC, including culture, context/ systemic issues and interpersonal aspects, factors affecting ability to manage change, factors affecting reasoning and problem solving, and mood (BPS, 2006). Moreover, the cognitive models of psychosis proposed by Garety et al. (2001) and Morrison (2001) emphasize the central role of cognitive factors in the process of reasoning and problem solving so these models will also be used to inform the development of the psychological formulations.

Philip Murphy will receive regular supervision from Dr Paul Hutton, who has received in-depth training in cognitive behavioural therapy (CBT) for psychosis as part of his role as trial therapist on four clinical trials of CBT for psychosis (Hutton et al., 2014; Morrison et al., 2012; Morrison et al., 2014; Morrison et al., in prep). Dr Hutton has published a practice guide to collaboration in CBT for psychosis (Hutton & Morrison, 2013), and currently supervises several CBT therapists on a large multi-centre trial of CBT for clozapine-resistant psychosis, funded by the National Institute for Health Research.

Supervision will also be provided from Dr Robyn McRitchie, a clinical psychologist based in the Blair Unit. Dr McRitchie is also an experienced CBT therapist, and is very familiar with the staff and risk management protocols within the Blair Unit, is skilled at communicating case formulations to the clinical team, and is proficient at using the measures within the assessment battery. Thus, Philip Murphy will receive high quality supervision and training in both collaborative cognitive behavioural case conceptualisation, administration of standardised measures, risk management, and effective communication with teams.

MacArthur Competence Assessment Tool – Treatment (MacCAT-T: Grisso et al., 1997)

The MacCAT-T will be used to assess decisional capacity for treatment in the patient participants. This semi-structured interview measures understanding, reasoning and appreciation in relation to proposed treatment. In addition, it records whether the patient is able to make a choice or not. The instrument does not give a total score and the abilities are considered distinct, nor is it designed to provide, by itself, a simple binary (pass/fail) capacity assessment. The MacCAT-T interview typically requires 40 minutes. Of the instruments assessing decisional capacity for treatment, the MacCAT-T has received the most empirical support (Dunn et al., 2006). Indeed, numerous lines of evidence across a variety of populations support its reliability and construct validity (Dunn et al., 2006).

The Positive and Negative Syndrome Scale (PANSS: Kay et al., 1987)

It is important to measure psychotic symptoms to verify diagnoses given to the patient participants and because psychotic symptoms such as delusions have been shown to affect decision-making capacity (Owen et al., 2009). The PANSS will be used to measure psychotic symptoms in the patient participants. It is a clinician-administered scale comprising of 30 items with three main domains: the positive subscale (7 items), the negative subscale (7 items) and the general psychopathology subscale (14 items). The PANSS is widely used in clinical and research settings, and is regarded as a reliable means of symptom assessment (Muller et al., 1998). It typically takes between 30–40 minutes to administer.

The Brief Neurocognitive Assessment (BNA: Fervaha et al., 2014)

It is important to measure cognitive functioning as it is one of the main areas that stands out in the literature as affecting decision-making capacity (Owen et al., 2009). The BNA will be used to measure cognitive functioning in the patient participants. The BNA includes two cognitive tests: a working memory measure and a test of processing speed. It only takes up to 10 minutes to administer and has been shown to be reliable and valid when compared with more comprehensive neuropsychological batteries such as the MATRICS Consensus Cognitive Battery (MCCB) (Fervaha et al., 2015).

The Beads Task (Huq et al., 1988)

The Beads Task will be used to measure a "jumping to conclusions" (JTC) bias (a tendency to use fewer data to reach a decision) in the patient participants. The Beads Task has dominated research into the JTC bias. The typical Beads Task has been described in a recent review (Garety & Freeman, 2013). The Beads Task has consistently discriminated people with delusional beliefs from those without such beliefs (Garety & Freeman, 2013). It typically takes about 5 minutes to complete.

The Cognitive Biases Questionnaire for psychosis (CBQp: Peters et al., 2014)

The CBQp will be used to measure cognitive distortions in the patient participants. It has the advantage of capturing the 5 common cognitive distortions within 1 questionnaire (jumping to conclusions, intentionalising, catastrophizing, emotional reasoning, and dichotomous thinking) which are considered important for the pathogenesis of psychosis. The CBQp consists of 30 vignettes of everyday events. Respondents imagine themselves in each situation and choose 1 of 4 possible cognitive responses to the scenario. Six scenarios have been generated for each bias. The CBQp has been shown to have good psychometric properties including good internal consistency and test-retest reliability (Peters et al., 2014). It is estimated to take no longer than 15 minutes to complete.

The Personal Beliefs about Experience Questionnaire (PBEQ: Pyle et al., 2015)

It is important to measure beliefs about psychotic experiences as these can be hypothesised to affect decision-making capacity. The PBEQ will be used to measure beliefs about psychotic experiences in patient participants. This is a brief 13-item self-report measure of an individual's beliefs or appraisals of their psychotic experiences, adapted from the Personal Beliefs about Illness Questionnaire (PBIQ: Birchwood et al., 1993) for use with those at risk of developing psychosis as well as those experiencing frank psychosis. Items relate to the perceived causes and consequences of psychosis. As with the PBIQ, items are rated on a 4-point scale. It typically takes about 5 minutes to complete.

The Brief Core Schema Scale (BCSS: Fowler et al., 2006)

Cognitive models in the area of psychosis suggest that negative beliefs in relation to self and others may contribute to the delusional experience (Garety et al., 2001; Morrison, 2001) and therefore these beliefs could be hypothesized to affect TDMC. The BCSS will be used to assess schemata concerning self and others in patient participants. It is a 24-item self-report scale concerning beliefs about self and others that are assessed on a 5-point rating scale. Four scores are obtained: negative-self (6 items), positive-self (6 items), negative-others (6 items), and positive others (6 items). The BCSS has good psychometric properties including reliability and validity, and has been shown to distinguish psychotic patients from controls (Fowler et al., 2006). It typically takes less than 10 minutes to complete.

The abbreviated version of the Scale to Assess Unawareness in Mental Disorder (SUMD: Michel et al., 2013)

It is important to measure insight as it is one of the main areas that stands out in the literature as affecting decision-making capacity (Owen et al., 2009). The abbreviated version of the SUMD will be used to measure insight in the patient participants. This is a standardised expert-rating scale based on a patient interview and comprises 9 items rated on a 4-point scale. It typically takes between 15–20 minutes to administer. This scale has been shown to be a valid and reliable instrument for measuring insight in patients with schizophrenia (Michel et al., 2013).

The short-form version of the Depression Anxiety Stress Scale (DASS-21: Lovibond & Lovibond, 1995)

It is important to measure depression, anxiety and stress as these factors have been shown to affect decision-making capacity (Owen et al., 2009) and contribute to the delusional experience (Garety & Freeman, 2013). The DASS-21 will be used to measure these factors in the patient participants. It is a brief 21-item self-report scale of state negative affect, consisting of three 7item subscales measuring depression, anxiety and tension/stress. Items are rated on a 4-point scale. The DASS-21 typically takes less than 10 minutes to complete and has been shown to be reliable and valid (Clara et al., 2001).

The Rosenberg Self-Esteem Scale (RSES: Rosenberg, 1965)

It is important to measure self-esteem as it has been identified as contributing to the delusional experience (Garety & Freeman, 2013) and consequently may also affect TDMC. The RSEQ will be used to measure self-esteem in the patient participants. This is a widely used 10-item self-report measure of overt global self-esteem. Each item is rated on a 4-point scale.. The RSEQ has demonstrated adequate psychometric properties including reliability and validity (Dick & Shepherd, 1994). It typically takes less than 5 minutes to complete.

The Penn State Worry Questionnaire (PSWQ: Meyer et al., 1990)

The PSWQ will be used to measure worry in the patient participants. This is the most frequently used instrument that assesses pathological worry. The PSWQ is a brief 16-item self-report inventory designed to capture the generality, excessiveness, and uncontrollability of pathological worry. Items are rated on a 5-point scale. It typically takes about 5 minutes to complete. The PSWQ has been shown to have good psychometric properties including reliability and validity in clinical samples (Brown et al., 1992).

The Brief Strengths Test (Peterson & Seligman, 2004; Seligman, 2006)

The Brief Strengths Test will be used to measure the strengths of the patient participants so that their strengths can be incorporated into the formulations where possible. This is a shortened version of Seligman's 240-item Value in Action Inventory of Strengths. The Brief Strengths Test is a self-report measure containing 24 statements, each pertaining to one of Seligman's 24 defined strengths. Each statement is rated on a Likert scale ranging from one (very unlike me) to five (very much like me). It typically takes about 10 minutes to complete. The Brief Strengths Test has demonstrated good psychometric properties including internal reliability (Peterson & Seligman, 2004).

The Attributional Style Questionnare parallel form (ASQpf: Lyon et al., 1994)

The ASQpf will be used to measure patient participants' overt expression of attributional styles. The ASQpf requires subjects to make hypothetical cases for six events and six failure events. The subjects are then required to rate this stated cause along a 7-point continuum in relation to: (a) internality vs. externality, (b) stability vs. instability, and (c) globality vs specificity. The ASQpf has been used to demonstrate an externalising bias for negative events in people with delusional beliefs, although the evidence has been mixed (Garety & Freeman, 2013). The ASQpf typically takes about 20 minutes to complete.

The Emotional Stroop Task (Kinderman, 1994)

The Emotional Stroop Task will be used to measure covert self-esteem in the patient participants, as low covert self-esteem has been found in patients with delusions (Kinderman, 1994). In this task, participants are required to name the colours of various words on a computer screen. Colour-naming is typically slowed for emotionally salient words, and thus response speeds can be used as an index of the degree to which the emotional salience of a word (or class of words) has interfered with performance. This task typically takes about 5 minutes to complete.

The Young Mania Rating Scale (YMRS: Young et al., 1978)

It is important to measure mania as it has been shown to affect decision-making capacity (Owen et al., 2009). The YMRS will be used to measure mania in the patient participants. This is a widely used 11-item clinician-administered scale measuring various symptoms of mania such as elevated mood, irritability, sleep, behaviour and insight. Each item is rated on a 5-point scale. The YMRS has demonstrated adequate psychometric properties including reliability and validity (Young et al., 1978). It typically takes about 10 minutes to administer.

Sample Size

7) What sample size is needed for the research and how did you determine this? (IRAS A59 and A60)

A recent analysis of the concept of "case series", which included 586 articles, suggests that a case series should have more than 4 patients while 4 patients or less should be reported individually as case reports (Abu-Zidan *et al.*, 2012). With this recommendation in mind, the aim of this thesis is to recruit between 8 and 10 patient participants for assessment and formulation of treatment decision-making capacity.

The other component of this thesis will be primarily qualitative in nature, as both patient and clinician participants will be interviewed using a semi-structured interview to examine the acceptability and feasibility of assessing and formulating treatment decision-making capacity. It has been argued that there are no computations or power analyses that can be done in qualitative research to determine a priori the minimum number of participants required (Sandelowski, 1995). However, recent guidelines for thematic analysis, which will be the qualitative approach adopted in this thesis, suggest that 6 to 10 participants are sufficient for interviews (Braun & Clarke, 2013). Therefore, for the other component of this thesis, the aim is to follow-up all of the patient participants, and to recruit between 6 and 10 clinician participants.

8) Outline reasons for your confidence in being able to achieve a sample of at least this size.

Initially, the plan was just to recruit participants from wards in NHS Grampian. We are now planning to also recruit participants from wards in NHS Lothian. This enhances the likelihood of being able to achieve a sample of at least this size.

Analysis

9) Please describe the methods of analysis (statistical or other appropriate methods, e.g. for qualitative research) by which the data will be evaluated to meet the study objectives. (IRAS A62)

Characterisation of the sample

Demographic information, clinical characteristics and scores on the structured measures will be presented in summary form (mean, median, proportions). Individual scores on the structured measures will be compared to relevant population norms, where possible, for each patient participant.

Quality of the cognitive-behavioural assessment and formulation

The extent to which collaboration is feasible with this group, and the extent to which it is possible to produce good quality formulations of TDMC, will be assessed by a named collaborator using the CCC-RS. The results will be presented in summary form, as well as individually for each patient participant.

Utility of the cognitive-behavioural assessment and formulation

The reasons for impaired TDMC given by patients and clinicians, pre and post assessment and formulation, will be rated by two independent researchers who will be blind to the temporal order of the reasons supplied (i.e. whether they were gathered before or after the assessment and formulation process). They will be asked to rate, using a simple Likert-scale, the extent to which they believe the list of reasons demonstrate a rich and insightful understanding of the factors that impair TDMC. A within-subjects t-test or a Wilcoxon signed-rank test (depending on whether the data meet parametric assumptions) will be used to examine whether their ratings for post-formulation reasons are significantly higher than their ratings for pre-formulation reasons. Standardised effect sizes will also be presented for the difference, with 95% confidence intervals.

A narrative summary of the process and outcome of the assessment and formulation procedure will be provided for each patient participant, as per other case series work in psychosis (e.g. Maddox *et al.*, 2013; Morrison *et al.*, 2001), and will help readers judge the feasibility and utility of the process. Participant descriptions will be pseudonymised to ensure confidentiality.

Development of hypotheses regarding factors that help/hinder TDMC

It is hoped that hypotheses regarding factors that help/hinder TDMC in this group will emerge from a thematic analysis of both of the transcripts of the interviews (Braun & Clarke, 2006; Joffie & Yardley, 2004), the formulation letters/diagrams, the multi-disciplinary discussion regarding their findings, and inspection of the results of the assessment battery. In relation to the transcripts, the primary researcher will initially read through the transcripts and code for certain categories. If a category is maintained more than once they will then be made into broader semantic themes. To ensure quality of analysis, the academic supervisor will be asked to read the transcripts and qualify the themes. They will then be asked to modify or add any themes they feel have been missed.

Acceptability and safety of the TDMC assessment/formulation process

Thematic analysis will also be applied to the transcripts of the post-formulation interviews with patients and clinicians, with a focus on identifying themes relating to acceptability and safety. Mean acceptability ratings will be reported, together with proportions reporting moderate to high acceptability. The number of participants leaving the study early will also be reported, together with reasons for discontinuation if available.

Project Management: Timetable

10) Outline a timetable for completion of key stages of the project.

There are a number of key tasks that are necessary for the success of the project. The following timetable is proposed for the completion of each of these key tasks:

- Start of data collection: October 2016
- End of data collection: May 2017
- Data coding and analysis: November 2016 to June 2017
- Write-up of final paper: June 2017 to July 2017
- There is no intention of reporting interim results in the study.

Management of Risks to Project

11) Please summarise the main potential risks to your study, the perceived likelihood of occurrence of these risks and any steps you will or have taken to reduce these risks. Outline how you will respond to identified risks if they should occur.

One of the main risks was not being able to recruit enough participants. In order to reduce this risk, we are now planning on recruiting participants from wards in NHS Lothian as well – initially, the plan was just to recruit participants from wards in NHS Grampian.

Knowledge Exchange

12) How do you intend to report and disseminate the results of the study? (IRAS A51)

This study will be written up as part of a thesis for the Doctorate in Clinical Psychology, which will be available for viewing through the University of Edinburgh library. The thesis will include both a systematic review/meta-analysis and a journal article based on this study. Both will be submitted to a relevant peer-reviewed journal for publication.

Within the NHS Health Boards in which the study takes place, the findings will be communicated via a presentation. As the Mental Welfare Commission for Scotland have already expressed interest in this kind of research, opportunities to present to them will also be explored. Finally, it is hoped that this research will be further disseminated by making presentations at national/international conferences (e.g. BABCP Annual Conference, Division of Clinical Psychology Annual Conference).

13) What are the anticipated benefits or implications for services of the project? (E.g. If this is an NHS based project, in what way(s) is the project intended to benefit the NHS?)

The assessment of treatment decision-making capacity (TDMC) has become increasingly important with the move away from the paternalistic role of healthcare professionals towards a greater emphasis on an individual's own treatment decisions (Schneider, 1998). Although reliable assessments of TDMC have been developed (Cairns *et al.*, 2005; Okai *et al.*, 2007), no attempts have yet been made to develop a formulation-driven assessment of TDMC among patients with psychosis. Such an assessment might be used to explain the factors that help or hinder TDMC in these patients which might in turn inform intervention strategies. If this research goes as planned, a structured protocol will be developed for assessing and formulating TDMC among patients with psychosis. Moreover, this protocol will not be profession-specific – it will be informative to a range of healthcare professionals in the NHS who would like to do a more formulation-driven, thorough and psychologically informed assessment of TDMC.

14) Are there any potential costs to this project?

Potential costs for the University

The University may be asked to cover the costs of some of the measures if they are not freely available, such as the Beads Task.

Potential costs for the NHS Health Boards

The NHS Health Boards will be asked to cover the costs of stationery and printing for the use of the measures.

15) Any other relevant information.

Not applicable.

16) Key References

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Appendix B: Individual patient participant scores on the structured assessments (as part of the intervention) and corresponding norms

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
MacCarthur Competence Assessment Tool-Treatment						
Understanding (0-6)	5.33	4.3*	4.65*	5.33	1.85**	5.6 (0.66), Grisso 1997 (Grisso, Appelbaum, & Hill-Fotouhi, 1997); 5.6 (0.7), Palmer 2004 (Palmer, Dunn, Appelbaum, & Jeste, 2004) (both NC)
Appreciation (0-4)	4	3	0	4	0	-
Reasoning (0-8)	8*	5	5	8*	4	6.15 (1.69), Grisso 1997 (Grisso et al., 1997); 7.1 (1.2), Palmer 2004 (Palmer et al., 2004) (both NC)
Expressing a choice (0-2)	2	2	2	2	2	1.9 (0.2), Palmer 2004 (Palmer et al., 2004) (NC)
Total (0-20)	19.33	14.3	11.65	19.33	7.85	-
Positive and Negative Syndrome Scale						
Positive (7-49)	25**	33**	11	7	39**	8.9 (2.6), Palmer 2004 (Palmer et al., 2004) (NC)
Negative (7-49)	7	15**	20**	30**	15**	8.1 (1.8), Palmer 2004 (Palmer et al., 2004) (NC)
General (16-112)	31	50	25	30	63	-

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Total (30-210)	63	98	56	67	117	61 = mild illness 78 = moderate illness 96 = markedly ill 118 = severely ill; Leucht 2005 (Leucht et al., 2005)
Scale to assess Unawareness in Mental Disorder – abbreviated version						
Awareness of disease & need for treatment (3-9)	3	-	-	3	-	-
Awareness of positive symptoms (3-9)	6	-	-	N/A	-	-
Awareness of negative symptoms (3-9)	N/A	-	-	-	-	-
Personal Beliefs about Experiences Questionnaire						
Internal shame & defectiveness (0-18)	16*	-	7	9*	-	12.27 (2.68); SCZ, Morrison 2014 (Morrison et al., 2014)
External shame (0-6)	5	-	4	5	-	4.81 (0.84); SCZ, Morrison 2014 (Morrison et al., 2014)
Negative appraisals (0-12)	10*	-	5**	5**	-	13.94 (3.12); SCZ, Morrison 2014 (Morrison et al., 2014)
Total (0-36)	31	-	16**	19**	-	33.76 (5.80); SCZ, Morrison 2014 (Morrison et al., 2014)
Beads Task, N beads	6	1	-	15	-	≤ 2 beads = JTC Dudley 2016 (Dudley, Taylor, Wickham, & Hutton, 2016)
Cognitive Biases Questionnaire						

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Jumping to conclusions (6-18)	10*	13**	-	9	-	8.5 (1.3) NC; Peters et al., 2014 (Peters et al., 2014)
Emotional reasoning (6-18)	6*	-	-	6*	-	7.2 (1.1) NC; Peters et al., 2014 (Peters et al., 2014)
Intentionalising (6-18)	6*	-	-	8	-	7.3 (1.1) NC; Peters et al., 2014 (Peters et al., 2014)
Catastrophising (6-18)	6*	-	-	7	-	7.1 (0.9) NC; Peters et al., 2014 (Peters et al., 2014)
Dichotomous thinking (6-18)	6	-	-	6	-	6.5 (0.7) NC; Peters et al., 2014 (Peters et al., 2014)
Total (30-90)	34*	-	-	36	-	36.5 (2.7); NC; Peters et al., 2014 (Peters et al., 2014)
Brief Neurocognitive Assessment						
Compositive z-score	-1.2*	-2.1**	-	-1.85**	-	0.0 (0.8); NC; Fervaha 2015 (Fervaha et al., 2014)
Letter-number Span Test	11**	8**	-	7**	-	15.8 (3.4); NC; Fervaha 2015 (Fervaha et al., 2014)
Symbol Coding Test	47	36*	-	45*	-	56.7 (10.8); NC; Fervaha 2015 (Fervaha et al., 2014)

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Rosenberg Self-esteem Scale (0-30)	19	19	-	30*	-	21.1 (4.49); Collett 2016 (Collett, Pugh, Waite, & Freeman, 2016) 25.12 (3.53); Kesting 2011 (Kesting, Mehl, Rief, Lindenmeyer, & Lincoln, 2011); (Both NC)
Brief Core Schema Scale						
Positive self (0-24)	19**	17*	24**	24**	-	10.2 (4.23); NC; Fowler 2006 (Fowler et al., 2006)
Negative self (0-24)	4	14**	0	0	-	3.55 (3.55); NC; Fowler 2006 (Fowler et al., 2006)
Positive other (0-24)	19*	16*	24**	20**	-	10.43 (4.51); NC; Fowler 2006 (Fowler et al., 2006)
Negative other (0-24)	0	17**	0**	0**	-	4.07 (4.04); NC; Fowler 2006 (Fowler et al., 2006)
Emotional Stroop						
Reaction time to sad words (ms)	1156.84**	1571.8**	-	810.94**	-	621.04 (94.75); NC; Besnier, 2011 (Besnier et al., 2011)
Reaction time to neutral words (ms)	831.8**	1581**	-	819.24**	-	614.04 (94.75); NC; Besnier, 2011 (Besnier et al., 2011)
Difference score (ms)	+325.04**	-9.2	-	-8.3	-	-6.19 (60.02); NC; Besnier, 2011 (Besnier et al., 2011)

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Implicit Attitudes Test	-0.19	-	-	-	-	-
Attributional Style Questionnaire						
Internality score, negative events (7-42)	30	17	-	6*	-	23 (8.97); NC; Lyon 1994 (Lyon, Kaney, & Bentall, 1994)
Internality score, positive events (7-42)	26	-	-	18*	-	29.71 (6.12); NC; Lyon 1994 (Lyon et al., 1994)
Penn State Worry Questionnaire (16-80)	35	66**	-	16**	-	42.22 (11.15); NC; Gillis 1995 (Gillis, Haaga, & Ford, 1995) ≥65 = GAD caseness; Fresco 2003 (Fresco, Mennin, Heimberg, & Turk, 2003)
Depression, Anxiety, Stress Scale-21						
Depression (0-21)	2	-	-	0	-	5.55 (7.48); NC; Crawford 2003 (Crawford & Henry, 2003) ≥5 = mild ≥7 = moderate ≥11 = severe ≥15 = extremely severe Henry 2005 (Henry & Crawford, 2005)

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Anxiety (0-21)	5	11*	-	0	-	3.56 (5.39); NC; Crawford 2003 (Crawford & Henry, 2003) ≥3 = mild ≥5 = moderate ≥8 = severe ≥12 = extremely severe Henry 2005 (Henry & Crawford, 2005)
Stress (0-21)	2	-	-	0	-	9.27 (8.04); NC; Crawford 2003 (Crawford & Henry, 2003) ≥8 = mild ≥10 = moderate ≥13 = severe ≥17 = extremely severe Henry 2005 (Henry & Crawford, 2005)
Total (0-63)	9	-	-	0	-	18.38 (18.82); NC; Crawford 2003 (Crawford & Henry, 2003) ≥14 = mild ≥18 = moderate ≥28 = severe ≥38 = extremely severe Henry 2005 (Henry & Crawford, 2005)

	Participants (raw scores)					
Name of assessment (min-max score)	**P1**	**P2**	**P3**	**P4**	**P5**	**Data for interpretation, mean (SD)**
Young Mania Rating Scale (0-60)	22	5	-	0	-	2.5 = Normal, not ill 5 = Minimally ill 10 = Mildly ill 16 = Moderately ill 25.5 = Markedly ill 36 = Severely ill 45 = Very severely ill Bipolar Disorder; Berk, 2008 (Berk et al., 2008)
Calgary Depression Scale (0-27)	2	5	0	0	-	≥5 = Major depressive episode Lako 2012 (Lako et al., 2012)
Brief Strengths Test (24-120)	120	-	-	116	-	-

*≥1 SD more or less than comparator sample; **≥2 SDs more or less than comparator sample
Note: SD = standard deviations; SCZ = schizophrenia; NC = non-clinical sample

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